Horseless

...THE...

Horseless Age

VOLUME 11. JANUARY 7, 1903. NUMBER 1.

Doctors' Number.

IGNITION.

LEGISLATIVE AND LEGAL.

LESSONS OF THE ROAD.

MACHINERY AND TOOLS.

MATERIALS OF CONSTRUCTION.

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WHEELS AND TIRES.

THE HORSELESS AGE

...EVERY WEDNESDAY...

Devoted to Motor Interests

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THE HORSELESS AGE.

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The Old Year and the New.

The year 1902 has been one of substantial growth and general prosperity for the American automobile industry, and also, we believe, for the industry in other leading automobile producing countries. The automobile movement in this country has begun to assume enormous proportions, an indication of which fact may be found in the general enactment of special legislation pertaining to automobiles throughout the country.

In the evolution of the automobile the year has been marked by the extensive introduction of heavy, high powered touring cars. The fact that this type of car has been taken up by many manufacturers has given a strong impetus to country touring in automobiles, and many long tours have been accomplished very successfully during the past season, in spite of the generally unfavorable weather. However, although much attention has been paid to touring cars, the moderately sized and powered vehicle has not been neglected. In fact, during the year a considerable number of two passenger vehicles weighing between 1,000 and 1,500 pounds, which may be regarded as the range of weight comprising the most practical everyday vehicle for common roads, have made their appearance, and the original light runabout types have been uniformly increased in weight, so that now most of them at least closely approach the lower weight limit above mentioned. The general tendency in design has been toward greater power, longer wheel base and more refined body lines, and it now appears that the progress represented by the 1903 models will be chiefly along these same lines.

The year 1902 will probably be most prominent in the annals of automobile history as the year of organization of the American Automobile Association. Automobile clubs had been in existence for some years, but the multiplication of automobile competitions and their consequent disputes, as well as the increase of seemingly unjust legal persecution of automobile users and of tyrannical regulations, made the formation of a strong national body most desirable, and an organization was happily effected at Chicago early in March. The association has repeatedly had occasion to demonstrate its usefulness, and promises to greatly extend its scope and influence the coming year.

About a dozen new automobile clubs have been organized during the year in this country.

Owing to a shifting of dates there has been no show in New York during the year, but a very successful show was held in Chicago—the first automobile show in the West to which this description could be applied. The great competitive event of the year, the New York-Boston and Return Reliability Run, was an unqualified success and proved beyond a doubt that substantial progress had been made toward the production of thoroughly reliable vehicles. A number of the 100 mile contests were also conspicuously successful in spite of many attendant faults, and their general results were in line with those of the big event.

While a retrospect of the year that has passed is thus in many respects most satisfactory and encouraging, the darker side is also not wanting. Accidents have been alarmingly numerous, especially for about two months during the height of the touring season, and a hostile feeling toward the automobile, or rather toward the abuse of the automobile, has developed strongly in some localities. Both of these phenomena have a common cause, the speed craze, and it is to be hoped that the active stand against reckless speeding assumed by many of the automobile clubs, as well as the strong public opposition to it, will in future tend to curb speed excesses and reduce to a minimum personal accidents and public antagonism.

An encouraging result of the year is the growth of the export business in automobiles. During the first eleven months the value of automobile exports was nearly four times as large as during the same period of the previous year. Many manufacturers are just now waking up to the possibilities of this field, and the proba-

bility is the value of exports will keep on increasing the coming year at the same rate.

In general the outlook for the year is bright. The capacity of the works which will supply the market in 1903 is large, but the demand for automobiles of all kinds will also be large. President Scarritt, of the A. A. A., estimates that 35,000 vehicles will be sold during the year, and if this estimate be correct the manufacturers who know how to get their share of the business will certainly not be idle.

Doctors' Number.

The present number, having been extensively advertised among physicians all over the country, will be read by several thousand who are not regular readers of The Horseless Age, and a few words may properly be said in introduction to the articles appearing herein, and for the guidance of readers inexperienced in automobile literature.

The object of this special number is, of course, to arouse the interests of medical men in the new method of locomotion, and particularly its application to their professional work. To this end, however, we have not adopted the salesman's methods—i. e., lauding the advantages of the machine and hiding its defects—but present the unbiased evidence of a large number of actual disinterested users, who, we believe, are best qualified to speak on the practicability of the automobile of today in a physician's work. No allowance of any kind need therefore be made, as would be the case if the information had originated with interested parties. Some of the writers may be a little enthusiastic and overlook minor troubles, but this is offset by the writings of others with pessimistic inclinations who are likely to exaggerate small annoyances. A number of articles written at the solicitation of and offered through agents or manufacturers have been returned, for the reason that they were evidently biased.

We would advise that in reading the experiences of different users the reader always keep in mind the date of manufacture of the machine, which will be found to be nearly always given. Rapid progress has been made in automobile construction, and many faults found in the early machines have been eradicated in the later models. A considerable amount of the experience related in this issue has been with earlier models, for the reason that last year's models, for instance, have not been in use long enough to form a reliable opinion about their cost of upkeep and the general satisfaction they give in the long run. Experience with models of three years ago, extending over three years, in most cases will naturally not appear quite so favorable as three or four months' experience with a last year's model, for the reason that a well built machine should run several months without needing any serious repairs of any kind. And for this very reason the more extended experience with the older models is more valuable, although it does not quite do justice to the modern machines.

It may not seem necessary, but to avoid misunderstanding we would observe that the opinions expressed by our contributors on various points, such as choice of motive power, most suitable weight and motor power, etc., are not necessarily our own, which they hardly could be since they vary so much.

We have also thought it advisable not to exclude the few cases where the use of the automobile in a medical practice was found impracticable and given up after a trial. These accounts in themselves may not be instrumental in arousing the interest of doctors in automobiles, but it has been our aim to give a complete view of the situation as it exists, and a knowledge of the causes of the failures may lead to their avoidance in the future.

We believe that the subject is dealt with in this number most completely, as the contributions hail from all parts of the United States, from city and country, and consider the advantages of all three motive powers under varied conditions; the number is, moreover, the largest single copy, so far as reading matter is concerned, ever issued by any automobile publication.

The Automobile in the Physician's Practice.

We believe that the most important practical application of the automobile at present is as a physician's carriage, for, as will be seen from the articles in this number, physician's automobiles may be found in small numbers in all parts of the country.

The advantages of the automobile in this line of work are fully brought out in the articles following, but it may be well to briefly summarize them here. Many physicians spend a large part of their time behind their horses, and where driving is ordinarily considered a recreation it is to them more or less of a burden. With an automobile they can save much of this time, as considerably higher average speeds are possible. Generally speaking, a certain time spent in an automobile results in less fatigue, probably on account of the large pneumatic tires, more perfect spring suspension, a more commodious seat and the perfectly even motion compared to the jog of the horse. Finally, we have never yet found anybody who did not derive more pleasure from a ride in an automobile than behind a team of horses.

Owing to its greater speed, the automobile permits physicians to attend to urgent cases more promptly, and a number of cases have been recorded in our columns where it is thought a life was saved through the use of the auto. The automobile commends itself more particularly to physicians who have a scattered practice, and most of all to those in districts in which the roads are good. On ordinary dirt roads which are deeply covered with mud for about two months of the year any self propelled vehicle is during that period impracticable. This, however, does not preclude the use of the auto in such districts during the rest of the year, as, to judge from letters received from physicians, they can often have the use of horses during the mud period for the keep.

Not the least of the advantages of the automobile for a physician is that it may safely be left standing on the curb for hours without an attendant while the physician concentrates all his attention on the case in hand.

It will sometimes be necessary on the trip to get out and make some slight adjustment or repair, resulting in the doctor's getting his hands and linen greasy, making him more or less unpresentable. This drawback does not exist if the doctor is always accompanied by a man, which many who have an extensive practice have found to be the best plan, although almost everyone prefers to handle the levers himself. However, in the latest models such parts as are likely to require attention on the road are mostly placed where they can be readily gotten at and without having to touch oily parts.

On the other hand the auto is more cleanly than the horse from a sanitary standpoint, as is well brought out by one writer in the present issue, who states that it is impossible to drive a horse, not to speak of cleaning him, without getting one's clothing contaminated with decaying organic matter, which it would be positively harmful to carry into the sick room. With the automobile there is absolutely no danger from this source.

New York City.

The Automobile in a City Practice.

By Ashley A. Webber, M. D.

The winter of '98 found me using my spare time investigating the merits of all the automobiles in the American market. As I look back it becomes apparent to me that I laid more stress upon durability than upon simplicity. The reason of this may have been an unwarranted conceit on my part that I could run any auto engine by virtue of my ability to run my alco-vapor launch.

After much seesawing and close study of the few practical machines then on the market I ordered a gasoline runabout of a Western manufacturer, to be delivered in the spring of '99. It was not simply the love of novelty that drove me to this step. To be sure, like everyone else, I was interested in the horseless wagon because of its newness, and the charm of controlling a tireless power was strong upon me, but there were weightier reasons still. While never keeping a strictly accurate account of my expenses with horses and carriages, I had become convinced that with bad bargains, sick horses, wear and tear on running stock, and careless drivers I could save money and annoyance with an auto, and this was consequently my main reason for changing. How well I succeeded may be judged from this article, for I have put down here only actual experiences and have tried to be fair both to the horse and the auto.

As time drew near for my auto to arrive I grew very anxious. It finally arrived, but my feelings when I first saw that machine cannot well be described. I had never seen anything like it before; the photograph did not begin to do it justice. I was mighty downhearted, but stood the bickerings of my friends with the best grace I could command. The manufacturer said that it was not very pretty, but it would do the work, and I tried to become reconciled. Its appearance was so unusual that it blocked the streets when it came to town.

The manufacturer devoted one whole week to teaching my man and myself how to care for and run the machine. Of course, I knew it all very quickly, or thought I did, which was worse. Anyway, for a few days after I got along finely, but shortly something happened that I could not adjust or repair. Then I lost faith in the machine. The things that I was on the lookout for didn't happen and those that I was not prepared for did. Then I called in people to fix things who knew less than I did myself. The end of this was that after many trials I decided I did not know enough about the machine to make it do good work and so informed the manufacturers, who, not waiting to write, wired me to put it aboard the cars at once, as they had several customers who wanted it. In a few days I received a check for the amount I had paid them. I was more than surprised at this, for I had never had any similar experience with a horse dealer.

It is of interest to note that I met the purchaser of this auto a year later and found that the machine had been doing duty every day. This convinced me that the trouble I had was due to lack of knowledge and not to the machine.

So much for my first experience. I was now convinced that horses were good enough for me, and not having then disposed of any of my stock I resumed horse travel once more. A month passed before I thought of automobiles at all, unless it was reflectively and ruefully as well. Then I took a ride in a steam wagon and the fascination was so strong that in a few days I owned one, and was once more being butted about on the waves of uncertainty, this time to the accompaniment of steam clouds instead of muffler explosions.

My experiences were many and varied. The steamer had one brake which worked when the machine was going ahead, but not when it was going backward. I discovered this while near the top of a long hill one day, when my power gave out, owing to low water, burnt out boiler, etc. The machine ran down hill backwards. I put on the brake, but it was not meant to be used that way and did not work; so we went over the bank together, the machine and I, with considerable damage to it and none to me, except a pair of barked shins. Realizing that I could not always be so fortunate I added to my steamer a double brake, low water alarm, pilot light, etc.

After this I got along finely. Of course I had some minor troubles, such as tires wearing out or blowing out, cones wearing out and balls breaking; but these were easy to repair. After being towed home several times at night—for I never allowed the machine to be towed in the daytime—I became quite proficient in making repairs and adjustments, and really got such excellent service that I sold all but one horse and buggy and bought another steam carriage, a light runabout, which so pleased me that I gave up horses entirely, and have never been sorry.

With the two steam wagons I found that I could do my work easily and have more time to myself. The heavier doctor's phaeton I used daily, reserving the lighter carriage for pleasure riding. The actual cost of running these wagons cannot be accurately estimated, for I kept buying extras which were not necessary to the good working of the machines, but which added greatly to the comfort and pleasure of operation.

So far as I could see, the one great drawback of these steam wagons was their tendency to freeze up in cold weather. Realizing that the successful doctor's automobile must stand all kinds of weather I cast my eye about for some other wagon which would possess the qualities which I had now found to be extremely essential to good service and, last but not least, permanent peace of mind.

At the automobile show in Madison Square Garden in 1900 I took a fancy to a three wheeler. The air cooled cylinder and general simplicity of it struck my fancy, and I bought one of the freaky looking little machines. It was so simple that I began operating it myself after a ride with the demonstrator and reading the general directions for care and operation. After getting a little more experience in managing the front wheel I began using it exclusively, finding that I could run it a week with less trouble than one would experience in attending to the fire, water, etc., of a steamer for one day. My man was delighted with it. There was so little trouble I could let it stand in front of my office all day if necessary, and for night work I found it indispensable. It could be turned around in a 9 foot circle by the handle and seldom failed to start on the first turn, good dry batteries being essential for this. Using four cells of battery and carrying four extra ones I found to be an excellent plan. When the engine missed an explosion it could readily be adjusted by my man while I was making a visit. Sometimes it was only necessary to use an old oil can filled with gasoline to clean the grease off the points. To blow air into the carburetor, to prime the cylinder, I used a two way rubber bulb and a piece of rubber tubing. The bulb was placed near the seat. This did away with blowing in the pipe at the back of the carriage.

This little machine served me well and continuously for five months. It made several trips of 50 miles, with but one or two stops, and these due to a desire for refreshments. The few simple rules that I followed were to use a thin cylinder oil, to wash the clutch out well with gasoline before taking a long run and to always use plenty of oil in the bearings.

In May last, feeling a desire for more speed, I purchased a new four wheeler of the same make. This last machine has been a source of much enjoyment to me. With the exception of four or five times that it was laid up for repairs, a day or two at a time, it has done daily service. Most repairs were made necessary by my carelessness. Once having run over a high stone on a country road and loosened the flywheel, it took my man one day to take it to a local machine shop, have it tightened and put back again. Another time I broke a ball in the main bearing while on my way home from Patchogue, L. I. It began cutting the cones and sprockets, but being in a great hurry to reach home and not having an extra ball in my tool case, I finished my trip in that condition. Both

cones and the ball race on the sprocket were destroyed and the cones loosened so much in their setting that duplicates could not be used. But by taking the parts to a local machinist I had new cones turned and a new sprocket made, and with these I have had no trouble since. The new ball race is not cut as deep as the old one was, which reduces the wearing surface for the balls and allows the use of a thicker cone. Tool steel, tempered in the tempering pot of a neighboring file manufacturer, was used for these repairs, and after four months there is no sign of wear.

Then, again, I lost my compression in the engine. The valves were examined and found all right. The piston was found to leak and upon removing it the pins holding the rings in place were discovered to be broken off, and the spaces in the rings all on top, which permitted the escape of gas. Recourse to the machinist and a set of new pins remedied this.

The little set screw in the igniter cam would sometimes give trouble. Being made of soft steel the point would not hold and the cam would turn on the shaft, which would retard the spark. A new screw made of hard steel with the point cupped settled this difficulty permanently.

In taking trips near large bodies of salt water, with the consequent damp atmosphere, I found difficulty in starting after a long stop. The cause of this was large drops of water on the air pipe close to the atomizer. This water was sucked in with the air and mixed with the gasoline, which in consequence would not ignite. The simplest treatment in the world would cure this trouble—namely, removal of the cause by wiping the drops of water off the air pipe.

A word or two now about prevention, although I have discussed cure first, which might be criticised were it not for the fact that we automobilists only learn the value of prevention by the cost of cure. Use a piece of chamois over your gasoline strainer when filling your tank; it will often keep out water enough to cause trouble were it allowed in the tank. Carry a good sized repair kit with duplicates of the small parts that might break or wear out and you will be able to make many slight repairs on the road. For example, one day last summer, while making a hurry call to Newtown, L. I., my igniter spring broke. In a very few minutes we had a new one in place; thus having a duplicate with me saved time and annoyance. Carry a new chain and also a few extra links; then you can change or repair your broken chain on the road in a few minutes. Inspect your brakes daily. A machine in use in our crowded city streets should possess a good foot brake and an emergency brake that will bring it to a stop in its length if not going faster than 8 miles an hour. This will save you many narrow escapes.

Traveling about at night is another thing to be considered. It is not so bad in the city, where the streets are good and well lighted. Even here, though, one should be thoroughly conversant with every part of his machine, while for night traveling in the country a perfect knowledge of all the ins and outs of the auto is a prime necessity. Narrow country roads are a tough proposition even when your horseless runs smoothly. Ruts, stones, turns in the road, etc., are constantly to be avoided or looked out for. Now, add to this the ever possible rain and your outlook is not brilliant.

Coming along a country road one dismal rainy night with no other light than that thrown out by my headlights and no accurate knowledge of my speed, I was suddenly confronted by a horse and carriage—on the wrong side of the road, and with a drunken driver. The carriage had no light and I could not be expected to see it far enough away to avoid doing it damage in that inky blackness. Yet at the risk of smashing my auto I must avoid a collision, and somehow I did. Perhaps 20 feet separated the two vehicles when I first saw the danger.

My lamps, being covered with moisture, did not throw as much light as they should have. The road was soft and slippery. To the left of the rig there was not room to pass and on the right stood a huge tree at the edge of the road. With a yell and blast of the horn I applied the brakes, pulled out the plug and turned the carriage at right angles into the woods. She drove in through the second growth of saplings for about 30 feet with a drop of three and a mighty crash of breaking wood. The fenders on the left side of the auto cut the horse's breast. The shafts would have struck me in the face but for the presence of mind of the physician who was with me and who pulled me over across the seat in the nick of time. With the aid of a hatchet and a number of men we hauled the machine back to the road and found our damage consisted of a bent fender, which I quickly removed, and some bent spokes. While we were straightening things out another belated automobilist came along and offered his assistance. His party had just paid a fine for fast driving and were on their way to Brooklyn.

We stopped at the first hotel to trade experiences, and were a mighty wet and subdued crowd. After some talk we concluded that the ability to do the proper thing instantly was, after all, a very important factor in running automobiles, if not the most important.

And now with cold weather upon us again I am quite satisfied that my change from horse to mechanical power was a brilliant one. Three horses could not do the work my automobile does daily. When I compare my runs over the rough streets of this section with the pleasure rides some people take over good roads and consider wonderful, I am amazed. As my carriage motor is air cooled this does away with all danger of freezing water. During cold weather I remove my fan and belt, since they are not needed.

Formerly it was said any man using two or more horses could save money with an auto. At the present stage of progress and improvements in horseless machines I think it no secret that an auto will do the work of one horse both cheaper and better than our ancient and honorable friend, the horse, ever could do it.

Four Years—Three Motive Powers.

By Dr. Frank LeC. Dowe.

In the summer of 1899 I made up my mind that the proper and coming mode of travel for the physician, especially for the doctor who practices in the suburban districts of a metropolis and has long drives between his calls, was the horseless carriage. I, therefore, inspected all the automobiles then on the market which I could locate, and finally decided that the most sensible, natty and compact rig was the small steam runabout then first on exhibition in New York.

I applied to the gentleman in charge of this first carriage (who, by the way, was one of the most consequential individuals I have ever met), and while he answered all the questions I asked, he did not seem to explain anything regarding the working of the carriage or seem inclined to exert himself to get an order. I had hard work to keep him in tow, but finally braced up sufficiently to request a ride. His answer was to the effect that I could leave my name and address, and a ticket would be sent me in turn for a certain day and hour, as all engagements were made ahead. The fact that my time was limited and that I lived in the upper portion of the city did not help me, as he could give me no encouragement for a demonstration for a week. The assistant was firing up at this time, and I made use of my eyes and learned something of the process, etc., and later saw a gentleman present his card for a five minutes' demonstration ride (he being ten minutes late).

I was interested to the extent that a few days later I took the night train, and next morning found myself in Boston. By 10 o'clock I was at "the company" factory and was there treated very cordially and given a long ride, and before leaving I paid my deposit of $400 and my machine was promised in New York thirty or sixty days later. I ordered one slight change from the regular carriage, a solid panel seat instead of the spindle, and was assured it would take no longer. I waited patiently for my carriage for three months and finally made things so warm at the New York branch that I was offered a spindle seat carriage from stock, as they did not know whether my order had been started at all. I took this carriage, an instructor accompanying it, and I felt very proud of the fact that I was one of the

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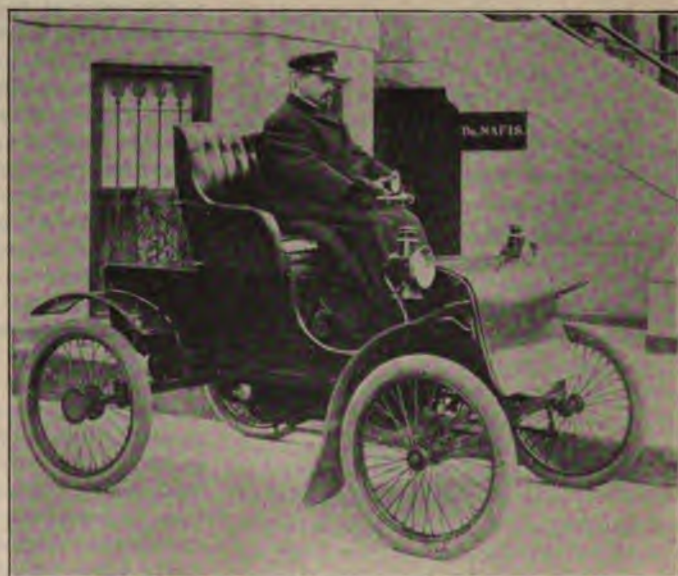

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KNOX GASOLINE.

WAVERLEY ELECTRIC.

GROUP OF NEW YORK CITY DOCTORS USING AUTOMOBILES IN THEIR PRACTICE.

first physicians in New York city to use an automobile in practicing. After two days' instruction my operator turned me loose, with the assurance that I could manage the machine as well as he. I went through the usual troubles of the beginner from having fire burn back, etc., although at that time I considered myself quite a mechanic, having successfully run several gasoline and steam engines in launches.

After having run for one week without trouble, I had the experience of burning the boiler, owing to the fact that I did not turn my water on before starting and having too much confidence in the good working qualities of my pump. I had a friend out at the time, and think I almost had a machine sold for "the company," when we came to a stop and I saw that no steam was registered. Of course, I thought the fire was out, but when I looked and found my mistake I fortunately had sense enough to extinguish the fire, and then saw that there was no water in the glass. I allowed the boiler to syphon full, and as it did not leak I thought I was all right; but when I got 20 pounds of steam up it was different. That day my carriage had its first trip to the shop, and, I regret to say that was only the first of a long series of troubles and expenses. I can honestly say that this first and last steamer of mine never went to be repaired, or to have some alteration made that it was not delivered to me with something out of order that was in perfect condition when it was sent there. Many a time I was notified that my carriage was ready and I made the trip downtown, only to find when arriving that it was a mistake and my carriage had not been touched.

Shortly after my first purchase I had two punctures and ordered them repaired, and also ordered two extra new tires put on. I stood one hour and thirty minutes waiting for two men to finish putting on two 2½ inch tires that I can today put on myself in ten minutes, and I had the entire rim spoiled by the so called mechanics pouring shellac on the concave side of the rims from a quart can, and allowing it to run through all the lug holes onto the face of the rims and the spokes.

About this time I ordered a larger gasoline tank and a better air tank. This time no repairs were needed, but in spite of this my engine was removed and another substituted. Fortunately I knew the factory number of my engine, as well as certain marks I had made on it. My demand to go through the factory and find my own engine was allowed; after several days' delay and numerous telephone messages my demand for a new engine or one in perfect condition was met with the promise that all would be made satisfactory. I refused to have the work done anywhere except on my own premises. On the arrival of two men with an engine one morning I was informed by them that they had a brand new engine, taken from one of the stock carriages from the floor. I told them as politely as one could, under the circumstance, that if the engine was all right that was all I asked. After installing this and firing up I could see that with the reverse lever ahead and the throttle open the rig would back; another second hand engine with links put in reversed in the course of repair work. Engine No. 3 was satisfactory.

Later on my carriage was started up at headquarters by a green hand with throttle open, and as one of the brick piers would not break my carriage had to. I was offered an apology from the company when the rig was delivered at my residence with a body split from back to front, with an iron brace put on the inside to hold the same together and a dash with half the top planed off. It took me six months to adjust this matter with the concern. I might write for hours and tell one experience after another like the foregoing, but, no doubt, this is nothing new to the users of steam carriages manufactured at that time. My happiest day was when I was paid $300 by a dealer for everything pertaining to a steam carriage. Still, with it all—though it may seem strange—I had acquired the reputation of always being in commission, and was considered by nearly all outside of "the company" to have no trouble at all. In those days we did not tell all our troubles for the public good.

A steam carriage of the type mentioned in my opinion was only fit for the very lightest work on asphalt or level dirt roads. The engine was too light and too hard to get at, and at the same time there was too great danger of losing small parts, which are liable to work off at any time. Two points, with which I will credit this type of carriage, are the ability to go at any speed in a crowd and its hill climbing ability when the pressure was sufficiently high.

ADOPTS ELECTRICITY.

The carriage which I am now using is an electric stanhope, and I believe that for physicians' use in city streets nothing can take its place. I purchased this carriage last spring, and I must admit I paid out considerable money before I learned by experience the care of storage batteries and electric motors. At first a decision of the courts enjoined me from the use of the batteries in my carriage and I placed in a new set at a cost of $430. My next experience was with the motor. The speed did not suit me, so I changed the gearing. Then everything seemed all right, until one day, as I was returning to my home from my morning calls, my carriage, without any warning, shot ahead for about 100 feet at twice its normal speed and then came to a short stop and ended with a flash of electric current. I glanced at the ammeter and saw the indicator hand over as far as it would go. I realized that there was a short circuit and immediately threw off the current. Investigating the trouble I found that the lock nut, which fastens the outer extremities of the segments of the commutator together, had become loosened and the commutator had ceased to exist as such, the segments sticking into the field coils in every direction. Of course, this was a case of "get a horse."

I had never been perfectly satisfied with the efficiency of this motor and had another make installed in its place, which, with changing gears, making castings, patterns, etc., cost me two months' delay. But as I got this time the best on the market I am fully repaid, as this carriage will travel 12 to 15 miles per hour on the level and climb bad grades in my neighborhood nicely. There are no electric wires in my place, and so I purchased this past summer a direct connected gas or gasoline engine and direct current dynamo, all on one base, and I must say I never saw a better working piece of machinery in my life. It is almost entirely automatic and if properly adjusted it will gradually cut the current down as the batteries become fully charged, and when full will automatically cut off the gas and electric spark. Four dry cells have run this plant without a miss fire ever since I bought it, and it has not cost me one cent to run, except for oil. It cost me for gas 7 cents per hour, and I let it take care of itself. This same plant will give 60 sixteen candle lights direct if one cares to use it for lighting purposes.

WILL TRY GASOLINE.

With all this and the fact that I consider I now have an almost perfect automobile, I am about to seek further troubles and go to the gasoline class. In justice to electricity I desire to give my reasons for so doing. As stated, I live in a district where appropriations for street improvements do not begin to be sufficient to put many of our roads in passable condition, and a physician cannot always pick out the best ones if he makes his calls; at the time of my writing, in order to get from my stable I must plow through 4 inches of mud for a long distance. Now my electric carriage will do this work for a reasonable time, but I consider that it is taking almost four times its normal rate of current, and as one-half the roads at this season are bad, and considering the heavy grades, in time there would be danger of overheating the motor, which accident might be expensive. Then, again, under the conditions I mentioned the batteries are discharging at two or more times their normal rate, which must surely shorten their lives. Many of the storage station employees similarly damage the batteries by forcing current into them at a high rate and continuing the same until the batteries are full. The above mentioned reason and the fact that I hesitate to rush through mud holes with a heavy electric rig, not knowing what kind of a bottom I will strike (if any), have caused my present determination to order a certain gasoline carriage weighing 1,000 pounds. I have given this carriage the most severe

tests in all sorts of weather and every condition of roads, and I cannot make it lay down. In fact, I have given it a more severe test than I would if the carriage was now my own property.

Does It Pay?

By W. G. Eynon, M. D.

Before entering upon a recital of my experiences with the automobile I must confess that previous bad luck with horses stimulated my desire to own a horseless vehicle to a considerable extent. Shortly before the motor fever attacked me a valuable horse, which I had owned but a short time, fell on the slippery pavement and broke his hip. A Bergh's man with a revolver terminated my interest in the animal. Shortly after an expensive carriage, less than a year old, dropped me into the street on several occasions through breaking the axles, and once I narrowly escaped serious injury. It may therefore be readily seen that I was in a decidedly receptive frame of mind when various automobile manufacturers dilated upon the merits of their particular make of carriage.

Alas! talk is cheap, but automobiles are not. If my story reads like a chapter of woes it is not because I am pessimistic as to the future value of the motor car, for when certain conditions in the industry are radically changed I am convinced that they can and will be made thoroughly practical. I shall endeavor to tell my experiences as truthfully and conscientiously as I can, and if any of my conclusions are not warranted by the facts, I am open to conviction and would be glad to admit that I had judged too hastily.

To take up events in their logical sequence, I purchased a light steam carriage of popular make, having been assured by the affable salesman that it was very easy to manage, and with ordinary care little likely to get out of order, or give me trouble; and, better, the company were ready to make good any defects in workmanship or to replace any parts made necessary by ordinary wear and tear during the first year. This sounded too good to be true, and as a matter of fact it was. Later on, experience taught me to be less credulous. This was in July, 1900.

My first few days of running were without incident, excepting the loosening of one of the nuts on one of the bolts which hold the steering knuckle to the front axle, the nut falling off and the bolt all but dropping out. That particular nut kept working loose until a friend suggested placing a few threads of cotton waste in the threads of the socket, which effectually remedied the trouble. I remember this trifling difficulty very well, because it was my first. Later on such minor annoyances were treated as little incidents just sufficient to keep one's hand in.

BURNER TROUBLES.

During the three weeks following I derived a good deal of pleasure from my carriage at the seashore. The machine behaved admirably on the smooth macadam roads and caused me no trouble, aside from a few blistered fingers, due, doubtless, to my inexperience in properly lighting the burner. Let me observe right here that, if there is no other reason, the gasoline burners as I know them constitute a fatal objection to the steamer. I have never seen one that would not on occasion blow out, burn back, burn down, burn everywhere when it felt like doing it. A complete list of all the troubles, large and small, that I encountered during the two years I operated this carriage would tax the columns of The Horseless Age. It will suffice to mention the most important ones.

THE STEAM CARRIAGE CLUB.

I was not long rendering myself eligible to membership in the steam carriage club by burning out the boiler with a glass full of water. I had been informed by my instructor that a full glass meant a full boiler; I learned on that occasion that it sometimes meant a stopped up gauge. Rubber washers have a way of disintegrating, and crumbling pieces sometimes find their way into the pipes leading to the glass, stopping it up completely, as in this instance. Water glasses broke in season and out of season, and at frequent intervals, until one day I purchased one at a hardware store for 5 cents which for some unknown reason held its own nearly a year.

At the end of a couple of months my chain contracted the habit of breaking and slipping off, and the burner burned back with aggravating regularity. On examination it was found that several tubes had been burned out of the burner and that the chain was considerably worn; when I informed the company I was told that I had done quite well to get two months' wear out of a chain and burner. Later experience taught me that with good care a burner without jointed tubes would last four or five months, and by cleaning the chain frequently it could be made to stand an equally long time.

FIRES, TOO.

I had my experience with fires, too. On one occasion the union on the gasoline pipe just above the jet valve shook loose, and while making a call I was startled by a commotion in the street, which proved to be my man frantically attempting to quench a fire which seemed to envelop the entire carriage. I immediately turned off the gasoline valve on the other side of the boiler, a few pails of water put out the fire, but not before it had caused over $100 worth of damage to upholstery and body. Several months later it caught fire again, and this time while running. The cause of this was that the steam pressure had fallen unusually low, resulting in imperfectly vaporized gasoline being fed to the burner. Since the vaporization depends upon the heat from the boiler, naturally the raw gasoline flared out and caught the woodwork. The damage this time was, fortunately, not so serious.

A BROKEN CRANK SHAFT.

For a month or so the machine would run with little trouble, until I began to think that I had solved the problem, but invariably after that length of time the trouble came in bunches to make up for it. As no provision had been made for letting condensed steam out of the cylinders, one of the crank shafts snapped in two when I attempted to start on one occasion.

SPOKES AND REACHES.

At different times each one of the braces holding the axles to the reaches broke in two. The rear ones snapped several times. As to the spokes, one a day was about the average after a few months' wear, and I therefore purchased heavier ones, taking out all of the original light ones. After that I was seldom bothered with broken spokes.

Cold weather brought troubles that seemed almost unsurmountable. In spite of them I struggled through snow and frost, not losing more than three or four days the whole winter. The steam gauge froze up regularly, but I soon learned to pay no attention to that, as other and more serious difficulties demanded my attention. Despite the fact that my chauffeur kept the carriage almost constantly in motion, the pump would freeze at times, and then a broken pump arm usually resulted, and once my whole pump frame was bent. As the auxiliary pump was invariably frozen also, it was quite a task to thaw it out again and get water into the boiler. On very cold days the automatic regulator would freeze and refuse to shut down. A little later the 9-16 inch pump, while it did not leak, failed to supply sufficient water, and I put in a 11-16 inch pump, which supplied plenty of water.

At the end of one year's wear the boiler lost the knack of steaming and became very troublesome, the least little hill pulling down the steam pressure so much that we could barely crawl. Several weeks in the shop and two long bills failed to improve matters for more than a few days. Evidently they had failed to locate the cause of the trouble. She simply could not be coaxed or driven into steaming properly. Since we could not obtain a good blue flame the difficulty appeared to be with the burner, but a new one did no better. Finally it occurred to me that perhaps the mixture was too rich. Changing the position of the mixing tube did not better it, so I offset the jet valve about half an inch. The result was most gratifying and the expense less than $2. Truly our lessons in running motor carriages are costly.

On another occasion the arch over the rear axle was found to be cracked nearly through. I am pleased to credit the company with having furnished me a new one free of charge. The little engine did its best on all occasions against heavy odds. Naturally, crossheads and driving rods were constantly working loose and packing in the pistons and elsewhere systematically

blowing out and leaking. Evidently the equation of power and labor had not been properly worked out by the makers of this carriage. Throttle and safety valves invariably began to leak after a few weeks of use. Piston rings required renewal every few months; either they would break or wear so that the steam blew through.

Insufficient feeding of oil to the cylinders was probably at the bottom of this trouble —in my hands cylinder oil cups were never a satisfactory device. Later on my gasoline bill reached nearly a dollar a day, the economy of fuel consumption diminishing for no well defined reason.

NOT ALL BLACK.

There is another side to this picture; it is not all black. I found that I could save nearly an hour out of a busy day over a horse and found much more pleasure in the riding. And I seldom actually broke down, as we were almost always able to limp along, making a few extraneous sounds perhaps, but moving in spite of them. I am also indebted to the steamer for a great many pleasant rides over the good roads in the vicinity of the city.

A word as to tires. The ordinary collapsible pneumatic tire I discarded long ago as an unnecessary nuisance. Tires of thick heavy rubber with a very small lumen will last six to eight months, and if they puncture will stand up quite well till worn out.

CHANGES TO GASOLINE.

In April of this year I purchased a light gasoline runabout, believing that I could get the same amount of work out of it with less trouble and care. The sequel shows a step forward, but not such a long one. It is true that I have not had as great a variety of mishaps. But those I have had ran up a rather alarming expense bill, over $200 in the company's repair shop alone.

CHAIN AND GEAR TROUBLES.

After running a few weeks I found several teeth broken out of the rear sprocket, and sent it down to have a new one put in. When I received it back the chain persisted in catching somewhere in the gear case. Two trips to the shop failed to remedy the trouble, so I ran it for several months with the trouble more or less in evidence. A new chain helped a little, but it would still grind and sometimes break. A new worm gear was soon needed, and a little later a new set of brass gears. I was informed that I had done extremely well to make the fibre ones last as long as I did. My last accident was the breaking of the pin holding the rear axle shaft to the compensating gear; the loose axle rammed into the gear case and created havoc with the sprocket and gear. This necessitated a new axle shaft and compensating gear. The cause of this accident was probably the catching of the chain referred to, and consequent strain on the pin each time the carriage was retarded. While bringing the carriage home the main shaft snapped in two and another trip to the shop was in order. After considerable argument the company allowed $16 for a new shaft, but the bill for work and new parts, including sprocket job and new chain, amounted to $73. Three sprockets and three chains in seven months seem a trifle too much. Three weeks is about the average life of my dry batteries, be they cheap or expensive ones. The gasoline consumption is about one-third that of the steamers for the same amount of work.

TRANSMISSION GEARS.

My transmission gear requires a vast amount of adjusting, and I will have to get some steel bushing done, as all the joints show lost motion. I find the gasoline carriage quite as handy in getting about the streets as the steam carriage, except that it will not get under way quite as quickly, but the fact that it is always ready to start gives it a material advantage over the slow firing up process required by the steamer.

THE REPAIR SHOP.

In reply to the query: Does it pay? There is no doubting the fact that the motor carriage as I have found it is a more expensive mode of transit than the horse; that it is necessarily so I am not prepared to admit. In my humble opinion the repair shop as it exists today forms one of the principal obstacles in the way of the successful substitution of the automobile for the horse. When it becomes possible for a man to have his auto repaired and cared for under the same business methods employed for his horse and carriage, the expense items will take on a different complexion. At present one is almost forced to patronize the repair shop maintained by the company from which he purchased his carriage. As long as your repairs are made in a shop from which you are excluded while your carriage is there; as long as you are charged such high rates for parts; as long as you are charged as I was on my last trip for sixty-seven hours' shop labor, at 60 cents per hour; as long, I say, as these conditions obtain the auto owner will find his machine an expensive luxury.

The ideal carriage for physicians' use will hardly be a steamer, with its multiplicity of pipes and valves, and dangerous gasoline burner requiring frequent adjusting and relighting. The gasoline car has on the whole substantial advantages, although I have found that the engine does not like being stopped and started as often as is necessary while making the daily rounds of a city doctor. The engine works better on longer runs. I have often noted that it would work quite unevenly while making calls in the morning, but when taken out for a pleasure ride in the afternoon would settle down to steady work and improve as the distance increased. The ideal doctor's carriage will be built for durability and power rather than speed.

There is no need of argument to convince me that their future practicability is already assured. I have been sure of that for some time. The day is not far distant when their use by physicians will be nearly universal. As I look back over the two and a half years, during which I drove the automobile considerably over 10,000 miles, I am convinced that not one of the troubles I encountered could not have been avoided had the builder had wide experience as to just how his carriage was going to act when given the test of daily use for, say, a year or more away from factories and experts.

MODERATELY LIGHT CONSTRUCTION.

Light, or at least moderately light, construction appeals to me as being the coming thing. Light weight properly distributed should not be incompatible with sufficient strength, and the light weight vehicle is much more economical in fuel and oil. The heavy carriage is awkward and unwieldy in getting about the streets, and in case it is stalled requires a great deal more power to move it about; furthermore, from what I have observed, wearing parts give out and break quite as often as in the lighter ones.

OBVIOUS ADVANTAGES.

The obvious advantages possessed by the motor vehicle over horse traction are so decided that it is a pity we are no nearer a standard wagon that will work every day with a minimum of trouble. I do not for a moment imagine that the manufacturers' path is strewn with roses; they have to suffer perhaps as much as the pioneer user. Owing to costly experimentation, they may not reap such a rich harvest in spite of their high rates for repairs and new parts. In spite of troubles and trials the motor vehicle is a very good friend when you are busy, and if given a fair chance will do your work much quicker than a horse; moreover, there is much more pleasure in handling a power you have perfect control of than in driving any kind of an animal. To the prospective buyer, especially if he be a physician and in the first stages of the auto fever, I would say make haste slowly; study the theory and practice of motor traction thoroughly before deciding, and when you become the proud possessor of a horseless vehicle do not wait for an introduction, but become thoroughly acquainted with every part of it. Expect more or less trouble, but if you possess an average amount of mechanical ability, not too slender a purse, and ordinary facilities, you will find that it will become a willing friend. Unless you were born under an exceedingly unlucky star, you will derive enough pleasure and help from it to more than compensate for the annoyances.

Metropolitan Experiences.

By Irving S. Haynes, M. D.

I have owned and operated an automobile for about two and a half years. My first machine was kept over a year and

then sold. My present one I have used since September, 1901.

I have been through the school of experience; it is costly, but valuable. My father was a physician in the country and always kept two or more horses, and I am therefore somewhat familiar with their care, use and limitations. For such work as my father had to do an automobile—of the present standard, at least—would clearly be inadequate, by reason of the lack of good roads in that part of the country.

For city use I think the automobile is superior to horses. Not because the auto is so much cheaper to keep than a horse, but on account of the very fact that an auto is a machine, devoid of all life, feeling and volition in itself. It consequently is absolutely under the control of the driver. A horse, no matter how well trained, at times loses his head—although his driver may not—and serious results happen. This is especially applicable to New York. Therefore, if it were a question of a horse or street car as a means of getting around to my work, I would take the street car, as it is cheaper, surer and quicker than a horse.

Concerning the use of an automobile in my practice, I am in doubt as to its efficiency and reliability. The automobile was purchased to satisfy my desire to operate and tinker about a machine—not primarily for use in my work. Hence I have never used it continuously, nor very much in stormy weather. True, I have been out in every sort of weather at times and over the very worst roads, but not from choice. On runs into districts where the streets are bad I have intentionally left the auto at home, in the belief that the machine would give me more pleasure for a run on a pleasant day into the country at my leisure than to push it over very rough places with the risk of breakage.

DEFECTS OF PRESENT AUTOMOBILES.

This leads to the consideration of the present automobile's weak points from a doctor's standpoint. From my experience with two different makes that I have owned and from riding in many other different kinds, I would say that the automobiles of the present are deficient. First, in case of riding. They are not nearly as comfortable over a rough road as a good carriage. This is due to the small wheels, short reaches and short stiff springs. Comfort in riding over a rough road could easily be secured by using larger wheels, a longer wheel base and long, flexible springs.

Second, the successful operation of one of the present automobiles, gasoline, steam or electric, is dependent upon too many small factors, failure in any one of which stalls the motor. My personal experience is with gasoline carriages, and of these I can speak.

My first carriage had a single horizontal cylinder, and my second, double vertical cylinders. I believe in two cylinders, opposed to each other; whether cylinders are vertical or horizontal I think is of small moment, so long as proper lubrication is secured, and the inlet and exhaust valves are easily accessible and readily removed. My preference is rather for the vertical motor; it is so convenient to get at for examination, adjustment and repairs.

A SUCCESSFUL ROAD REPAIR.

This point is illustrated by an occurrence which befell me quite recently. While returning from New Rochelle the motor stopped suddenly with a most terrifying pounding and smashing, so that I imagined there was nothing left to do but gather up the pieces of the engine. With a heavy heart I got out of the carriage and proceeded to investigate. The chain was in place; no gears were stripped. Pulling out the starting strap the wheel turned so easily that I thought the main shaft was broken; but this I soon saw was not the case, as the other end of the shaft rotated. Then I looked at the engine, which is a vertical two cylinder, located in the body of the carriage. I soon found that the inlet valve on one cylinder was missing. I said to my companion: "I think this is a case of going home by the cars and sending for the auto later," for I could not conceive how the valve (a conical seat poppet valve, 1½ inches in diameter, attached to a stem 4 inches long and three-eighths of an inch in diameter) could drop into a cylinder with a crank turning at the rate of 800 revolutions per minute, bringing things to a standstill all at once, without doing more damage than I could repair. So with great misgiving I removed the casting of the valve seat, fastened to the cylinder by two bolts, and gazed within. On top of the piston lay the remains of that valve, the stem bent S shaped, the saucer like part broken from the stem, and the edges chipped and warped. There were many small pieces from the valve seat casting. About an inch of a three-quarter inch collar for holding the valve in position was broken off and pounded up by the piston.

Careful examination showed no further break, but there were some fragments of the casting beneath the edge of the exhaust valve. This was removed, all the fragments taken out, an extra valve inserted in place of the broken one, the exhaust valve replaced and the motor started. "It went," and I felt as happy as a king. The time consumed by the repairs was one hour. At first, as the valve did not seat perfectly, the engine did not develop quite its full power, but later this difficulty seemed to disappear.

Had the motor been less conveniently placed and the valves not been so easily removed my trip would have terminated then and there.

I have been using the carriage daily since, and the engine seems to work as well as ever.

IGNITION EXPERIENCE.

The gas in the first engine was exploded by a make and break igniter, and the mechanism was always bothering me, not so much, perhaps, on account of the defects of the system as from defects of construction. My present engine is fitted with a jump spark igniter, and with the mica plugs I have gone for two and three months and never looked at them. The weak point in this system is in the trembler. Mine has worked very well; still it requires adjustment once or twice a month. The wiring is another source of trouble I have found. In the primary circuit when the wires are fastened to the trembler they will break after a while, and at the most inopportune place and time. It is my practice now to look over the wiring once a month or oftener.

DEFECTIVE WIRING.

Regarding the secondary wiring, there is really no satisfactory cable on the market. I say this after having looked the field over. The cable I use is the best I can get, but it needs "home treatment." It contains about thirty fine strands of silvered copper wire, wound and coated with a rubber covering, so that the diameter of the cable is a little more than a quarter of an inch. One might think this would hold the electricity, but it will leak. The only way to prevent it is to slip over the cable a good thick rubber tube. Concerning the way the wiring is done in the machines I have owned and those I have seen I would characterize it as "extremely amateurish." When the whole working of the engine depends upon a factor so simple as the integrity of the wiring and electrical conductors I think the matter should be treated from a professional standpoint, a study made first as to the best way to get from point to point; second, the best support to carry the cable, and then the very best conductors for the electricity. I should imagine that something could be learned from the manner in which wires are placed in the subways. Suitable lead pipes could be placed for the conveyance of wires on an automobile. In most of the machines the wires are held in place by a few strips of leather and tacks—about such work as would be expected from a small boy.

THE CARBURETOR.

Another disturbing factor is the easy derangement of the carburetor by dirt or water. I have had no trouble from dirt, but I have seen this mentioned as a factor. With water I have had plenty of bother. There is no gasoline sold in New York water free. Some samples have more water than others, but I have found water in all, even in the 76° test guaranteed, and hermetically sealed tin, 5 gallon cans. We may state, then, as a practical conclusion that all gasoline contains some water. This being so its disposition should be provided for by some sort of a

glass well at the side of the carburetor from which the water could easily be drawn by turning a stop cock.

TIRES.

Third—One of the weakest points about the present automobiles is the tires. I have been unfortunate perhaps, for I have had to buy four new tires since March last. These tires were punctured, not worn out. If not punctured a tire will wear for several years But once punctured its life is short. Tires can be improved, then, in being made puncture proof. I believe such a tire will be obtainable. I have had no experience with the different coverings and protectors for tires, but think very seriously of trying them.

HEATING IN WINTER.

Fourth—From my experience in winter the auto of the present is a cold, draughty, uncomfortable vehicle. Your feet and legs are nearly frozen while your body is muffled up in warm wraps. This is due to the open spaces in the floor of the automobile (at least in those I have owned), for the various levers that must be left free for perfect operation. If the auto is ever made especially for physicians it must have a system of piping for the exhaust gases or hot water to circulate beneath the floor and warm the vehicle. The piping must be under control by proper valves from the seat.

PROTECTION FROM MUD.

Then the bodies of the carriages should be made so as to direct the mud from the driver and favor the blanket dropping around the driver's legs instead of ballooning up from side currents, there being no way to tuck the blanket in behind some projecting part of the box.

STARTING FROM THE SEAT.

Fifth—A physician's auto ought to start from the seat. Mine does not. I have to get out and start the motor whenever it is stopped—voluntarily or involuntarily. When the driver chooses the time and place of stopping there is no objection to starting the motor from the ground. But if the motor stops from some other cause and in a mud hole or some other equally unpropitious place, the disadvantages of getting out and starting the motor are apparent; so is the mud and dust that you promptly spread over yourself and your previously clean rug. I have had to get out on a muddy hill in a rain and start the motor. Whoever has been in a similar predicament after or during a rain can imagine my feelings—and the condition of my shoes and the carriage.

CLEANLINESS.

A doctor needs to be clean—his hands, face, linen, clothes. One great objection in my own mind to using an auto in regular work is that if the doctor is his own chauffeur, as I am, it is next to impossible to keep clean. You may go along for a week or two, as I have done, then some little thing occurs, and you say this will take but a moment to fix. You start at it with a decent pair of gloves on and clean cuffs. It only requires one touch on an oily rod or part to spoil both.

If a doctor employs a competent driver some of these difficulties vanish, but the enjoyment in the auto for me is to run it, to learn it, to "diagnose" its ills and "treat" them successfully. I can ride in a street car with as much pleasure as in an auto run by another person (excepting, of course, a friend).

ITS CHIEF VALUE.

The chief value of an automobile is its time saving ability to go without fatigue—in fact, its being a machine. Hot weather, heavy grades, do not excite your compassion. Standing in the cold or rain makes no demand on your sympathy, or purse for a veterinary. It is only a machine—at present a useful one, but far from perfect—and especially so for a physician.

Like many other physicians I am looking for the perfect machine. I believe it will come; that it will be comfortable to ride in over average roads and in any sort of weather; that its motor and connections will be simple, direct, easily accessible, readily repaired on the road, and all manipulations essential to its working be made while in the carriage; that it will be a "thing of beauty," not a tremendous locomotive. It need not be very speedy—15 miles an hour is sufficiently fast—but it should be able to maintain this over all good roads and climb any hill a horse does.

BOTCH REPAIR MEN.

When the final standard machine is evolved can we not expect that there will be repair shops where repairs in truth, not botches, shall be made quickly, intelligently and for a reasonable consideration, that duplicate parts shall be kept on hand and substituted for the broken ones at once, the owner not having to wait, as now, for parts to be obtained from the factory, a delay of a week or even more for repairs that ought to take a half a day at most, and finally that pneumatic tires will be made as resistant and durable as at present, but puncture proof in addition?

A Successful Urban User.

By Dr. W. H. Nafis.

About two years ago I purchased my first machine—a steamer—intending to use it in my practice and for pleasure, believing that as a means of locomotion it was superior to horses, being faster and more economical. It certainly was faster (when in running order), but as for being more economical—not by a long shot. The first month I used that "bile" everything went lovely, and I must say that barring the purchase of some new tires I had little cause for complaint. After that month of bliss, however, my troubles began. When the engine wasn't out of order the gasoline or air connections or something else were, and honestly I believe that every part of that "bile" was renewed but the boiler; and it was only by eternal vigilance and keeping my eyes glued on the water column that that was not burned out.

Well, to cut a long story short, I managed to keep it running off and on (when not being fixed) for about ten months; the last month I used it I did not get one good ride out of it without something giving out; then laid it up until I could find a purchaser, which eventually I succeeded in doing. After that experience I decided that horses were more reliable, and certainly cheaper, and so used that means of travel until last June.

GETS THE FEVER AGAIN WITH GOOD RESULTS.

Early in the spring the auto fever again overtook me and I began a search for a suitable machine, one that would do the work and not necessitate the purchase of a new machine (in parts) every few months, so far as I could judge. Phew! then I had troubles in earnest. Every automobile that I looked at or inquired about was "just perfect and the best in the market." If there were any reliable makes of automobiles in the New York market that I did not see or ride in it was because I could not find them. As a result of my search the field narrowed down to three that seemed suitable for my use; they were of the gasoline type—two water and one air cooled. On weighing the arguments for and against and comparing the machines, riding qualities, speed, construction of engine, wagon, etc., I ordered the air cooled auto. The wagon was delivered to me in the early summer and went right into active service, being used in the mornings and early afternoons in my practice throughout the city, and then after working hours in riding through the country for pleasure. From the first it has been more than satisfactory, well behaved, sound, kind and true under all conditions of weather, roads and grades; it has not shown the slightest disposition to balk at hills or heavy going, and there have been enough and to spare of both. I have used it on several tours through the country, running from 60 to 100 miles without even stopping to oil, and must say that with it touring is a pleasure—no getting gray hairs calculating just how much water in the tank and how soon more would have to be procured, nor watching steam gauge, air gauge or water column to the exclusion of the scenery. I am able to go off on a 50 or 100 mile run and feel secure; it is not necessary for me to stop unless so disposed until my destination is reached, the air cooling being perfect even on the warmest days.

My wagon has averaged from 50 to 65 miles a day over all conditions of streets and roads, with no breakage of any portion of the machine, and so far as I can see no signs of any wear in the engine. I

have had some trouble with the tires, but of course that comes to all of us.

COMPARATIVE COST.

Many have asked me the comparative cost of operation of automobiles versus horses. That depends on several circumstances—type and make of machine, operator, how used and whether kept at a storage and repair station or by owner privately. My experience with steam machines was that they cost more than two horses to keep, with the uncertainty of starting and reaching one's destination after starting. With the wagon I am now using, keeping it in my own stable, the cost of operation will be a little less than the cost of keeping one horse in a boarding stable, most of the outlay being for tires. Of course, my auto does the work of three horses every day with the result that tires wear out rapidly.

Each type of automobile possesses certain advantages of its own—and certain disadvantages; for my use I prefer the air cooled gasoline wagon, as it is simple in its construction, always ready to go, can be started by a quarter turn of the crank and can do its work day in and day out with a minimum of care and attention. By doing away with water cooling, I believe that I do away with just that much ground for trouble, and know that there will not be any steaming, leaking or overheating.

A FEW POINTS FOR THE BUYER.

I want to say right here that in buying a motor wagon there are a few points that many overlook. They are simplicity in construction, accessibility of all vital parts of engine, strength of materials, and by that I mean strength where most needed, economy of gasoline consumption, speed and easy riding qualities. One of the most important points to an autoist is a thorough knowledge of the construction of the engine and wagon he is using and a careful scrutiny of the same frequently, thereby avoiding stoppages on the road and having to, as the small boys say, "get a horse" to help him on his journey.

A Gasoline Automobile in a City Doctor's Practice.

By Josef Saxl, M. D.

About two years ago I got the fever and began to look around for an antidote—the automobile. The homeopathic motto, "Similia similibus curantur" did not hold good with me, for I am becoming more and more enthusiastic about the automobile every day. After consulting a number of friends owning automobiles, others who did not; after visiting a number of manufacturers, nearly every one of whom told me that his make was "the make that am" and the rest all n. g.; after receiving any number of papers, catalogues and price lists, and being haunted day and night by agents, I decided upon the vehicle which to me appeared correct and built to my fancy. I deposited one-quarter of the purchase price, the rest to be paid on delivery.

After waiting about eight or ten weeks, and having written a number of impatient letters, the longed for antidote arrived. It arrived on an icy cold day, and as the manufacturers had thoughtlessly left the water in the tank and cooler the poor thing had caught cold on the railroad trip. The cooler had frozen and the expansion of the ice resulted in a fracture of the cooler and a dislocation of its joints. We telegraphed for a new cooler, which arrived in due time, accompanied by the sincerest apologies.

After a few days I started out with the machine, accompanied by the man the company had sent along to initiate me into the innermost mysteries of the mechanism. The vehicle was guaranteed to be 12 horse power, but it turned out to be only 8. It was also guaranteed to run 30 miles per hour on a level road. It might have run at that speed, but it would have needed to be down hill and a very good hill at that. Still, I overlooked these minor matters for the time being, and went through the crowded avenues of my neighborhood to make sure that I would be seen by all of my friends. But "pride goes before a fall." I left as proud as a peacock, and returned with my pride very much reduced; for after having run about 4 miles and mounted a grade of about 15 per cent. and about one-half mile long—nearly the entire distance on the low gear, for "the engine was too new yet," the chauffeur explained—the gait of the vehicle became somewhat spasmodic and the machine staggered along as though it was developing locomotor ataxia. As we proceeded the difficulty augmented, until the vehicle stopped completely, and we began our diagnosis of this strange malady. The consulting chauffeur decided that the water had got hot and the engine overheated, and so we detached the rubber hose from the tank, let out the hot water and went begging for a pail of cold water at the nearest habitation, which was cheerfully supplied after a little tip. The engine then recuperated and we went on our homeward journey, which was interrupted by a repetition of the same mishap, after running twenty blocks. The

Charging Plant of a New York City Doctor.

Leaving Stable with an Electric.

engine had to cool for about an hour, and as I had other business I was forced to take the car home, to my great chagrin, but to the amusement of my friends, who wanted to know what had become of the vehicle.

VIBRATOR TROUBLES.

Not discouraged by this first experience I went for another spin in the machine the same afternoon, with another chauffeur supplied by the company. The auto went quite well, with the exception of the engine misfiring several times, and the vibrator, which was operated by a cam, needing frequent cleaning. I might say right here that this kind of vibrator is a source of most frequent trouble to the automobilist, being usually located in an exposed place and easily getting dirty, which results in a poor contact. Moreover, the vibrator spring will break frequently, and often at the most inopportune time. At any rate, this vibrator trouble proved a lesson to me, and I saw to it that my second machine was equipped with a different device for this purpose.

The next day we made a trip to the park, so that I might get my hand on the throttle with as little danger to the walking public as possible. The first thing we noticed, after running a few blocks, was that the engine was getting hot again. The chauffeur the previous day had not tightened the clamps that held the rubber hose in place, and the jarring had loosened it so that we lost nearly all of the water before we noticed it. So I had to go begging in a Fifth avenue residence in front of which we were stalled for water, which the English butler, who wanted to know "'ow hit 'appened," cheerfully supplied. Meanwhile the chauffeur tightened the clamps—a poor arrangement, wire is better (second lesson)—and we went on to brave further troubles in store for us; and they were not long in coming.

We had hardly run ten blocks and arrived in the centre of the park, where there was no chance of getting water, when we noticed that the rubber hose was again coming off, and that without possibility of repair, as the clamps holding it to the cooler pipe had broken. Fortunately I had some bandages with me, and so we bandaged the bleeding surface as well as possible, and the result of our surgical operation was that the automobile was all right for the rest of the afternoon.

The necessary repairs having now been completed, my tuition in handling the throttle and spark lever and the steering gear, dodging wagons and cars, and infusing terror into the hearts of pedestrians was resumed.

All went well for an hour when suddenly the puffing of the engine became intermittent, the engine, in the language of the chauffeur, 'missing spark"; the speed went down, the gait became spasmodic, and the vehicle came to a standstill with a sudden jerk. An examination revealed a break in the wire attached to the spark plug. The difficulty was remedied in a short time, but further troubles were to come. After a few minutes the clutch lever became jammed and would not engage the high speed clutch, so we had to proceed on the low gear, which resulted in overheating of the engine, a disease which seemed to be chronic with my first vehicle.

The next day was one of repairs to the machine and recuperation of the owner, and the following day we had no mishap, which infused new hope into our hearts. Everything went well the following day until, when going up Broadway, suddenly, without premonition, the pulsation of the engine ceased instantly. We blocked the whole traffic and became the object of the jeers of the drivers, the well known enemies of the auto; among the crowd of pedestrians and the ever present urchins, with their well known advice to "get a horse," we pushed the auto to the curb, and discovered a fracture of the vibrator. A new vibrator carried in the chauffeur's pocket was rapidly substituted, and we arrived home safe and sound.

After these experiences the company pronounced us—i. e., my man and myself—proficient in handling an auto, and we started out bravely to face the unknown. Everything went O. K. for three or four days, and our delight was beyond all description, when one nice day we suddenly became stalled and stuck as tight as mud on a new suit. We telegraphed for help, which came after a couple of hours, and diagnosed the case as one of exhaustion of the battery. A new battery was substituted for the old one, and new life was infused in the auto and its owner.

The next object lesson I received shortly afterward when, while riding some distance from home, the motor suddenly started to race, and the auto stopped gradually. I do not need to mention the cause, as every automobilist will divine that the chain had broken. It is a surprising fact that in my first machine the makers had not made any provision for chain adjustment, and we therefore had to wait till the chain was long enough to take out a link, meanwhile breaking down frequently from the chain climbing the sprocket. The clutches were another frequent cause of trouble. These were of the expansion type, needing frequent readjustment and being hard to get at.

The next objectionable feature of this car was the cooler, which was located only a few inches above the ground, and in winter time was sure to sweep the snow when running, thereby retarding progress and causing sudden jerks when passing over snow banks. As a result we broke the axle one day, much to our chagrin and to the amusement of all the little boys in the neighborhood. The tires of this machine were of the single tube type, and I was bothered by frequent punctures. In my new machine I have clincher double tube tires, which have given far more satisfactory results. One of our greatest troubles we had a short time later when, while going up Fifth avenue; the engine stopped and refused to start, in spite of all examinations and attempts at repairs. At last we made the car go—not under its own power, however, but by means of the real "original 2 horse power." On the arrival at our storage station we discovered that the teeth of a pinion inside the engine case, which operated the sparking device, had worn very much, and several teeth had broken off. The pinion was made of brass, and in my opinion should have been made of steel to stand the strain of a high speed motor. In general the slow speed motors are to be preferred, for the wear and tear is less, and the reserve power greater.

I do not wish to recount the endless chain of troubles I had with this car, it being actually more often in the repair shop than in use, and I could not do without a team of horses in my practice besides. I hear that the manufacturers of this car are now turning out a better machine.

Just as a sailor feels when reaching the quiet haven after a stormy passage, so does an automobilist when, after having had endless troubles with his first machine, he gets another which answers his purpose, goes when it is required to, does not get stuck easily, and is easily repaired when it does. While I was looking for a new machine I noticed a number of friends of mine, physicians, who were running a little vehicle of the runabout type, which was easily handled and which had few of the drawbacks that my first one possessed. So I tried my fortune the second time. I made sure to have double tube tires put on and to familiarize myself with the internal construction of the vehicle.

I do not wish to claim this machine to be perfect, but it has been and is still very satisfactory in my service. The troubles with it have been very few and quickly remedied; I shall describe them, as it may possibly be of benefit to those who have not gone through the same experience.

AN IMPROMPTU GASKET.

One evening after a whole day's work the engine refused to start, in spite of all overhauling, cleaning of the plug, examination of all parts, wires, etc. Everything seemed in order, and still we could not obtain an explosion. Giving the case up as a hopeless one, we called up an expert by 'phone, who, for the moderate charge of $2 and with five seconds' work, did the magic trick. All that was the matter was that the contact screw of the coil had worked loose and moved out about one-twentieth of an inch. It is a small matter, but the knowledge of it may save the automobilist lots of work and lots of language of the kind the little boys consider manly. The same thing has happened to me once or twice since, but it has not cost me $2 again nor any loss of time. Another time we blew out the asbestos gasket be-

tween the cylinder, which mishap proved a valuable lesson, as, having no other material on hand, we made a packing out of an ordinary piece of cardboard, oiled on both sides, which took us home all right, where we could put in a new asbestos gasket.

The Gasoline Vehicle for the City Doctor.

By Dr. G. R. Pisek.

The doctor who makes up his mind to discard the horse and get the modern physician's conveyance will meet many problems to solve. In spite of all he will read and all his good automobile friends tell him he will learn a great deal by personal experience, be this experience sad or otherwise.

The gasoline vehicle which can be recommended for the city doctor is of the light runabout type. The carriages are easy to operate and easy to care for. They have an ample mileage on their supply of gasoline. There is nothing to watch but the road. It can be left standing in front of the house unattended and it is quiet in operation.

When I first had the auto intoxication I owned a heavy gasoline phæton, of the earlier type, which was, if nothing else, an excellent teacher; for the parts were poorly made, and those needing most attention were in the most inaccessible positions. There was more power than necessary for use in the city and it was difficult to keep down the noise, as there was no means of throttling. The weight of the carriage and vibration occasioned much trouble with the single tube tires. I never felt sure of getting home without some kind of tinkering at the machinery or running gear.

This I set forth to support my position as an advocate of the light runabout machine for city work.

Having sold my heavy automobile, I determined to profit by experience and bought a gasoline runabout, of strong and simple construction, weighing about 800 pounds and fitted with double tube clincher tires. This carriage has served me well and faithfully, even exceeding my anticipations. I have had my days in the repair shops, but this has always been for the purpose of replacing some part worn by the hard usage or for adding some improvement invented by the manufacturer. I have never been towed home in this machine, although the experience was not new to me in the older type.

Adjustments and repairs of a minor character are made by myself or my self trained chauffeur. To avoid the necessity of repairs, my practice has been to give the whole carriage a day off once a month for a thorough overhauling and cleansing. All nuts are tested and worn parts replaced if necessary. Old oil in engine and gears is cleared out with a bath of kerosene. In short, the machine is treated at least decently in return for the hard service expected of it by the physician.

If the doctor will equip his carriage with an apron and chain guard he will save his machinery and prevent frequent adjustments of his chain.

That the automobile is the vehicle for the doctor goes without saying. It is for him to choose the kind of machine that is to do his work from the many good ones in the market. He will not get an ideal machine, but he can get a practical one.

The automobile which will in the near future be built especially for the doctors will be of moderate power, strong in construction, parts easily getatable, air cooled in winter, automatically oiled, and parts protected from the mud of the road. The passengers will be protected from rain and winter wind, and the heat from the engine will be utilized in inclement weather.

When the manufacturer gives us a vehicle of this description we will sit down and write for more.

The Electric the City Doctor's Auto.

By Dr. J. George Sauer.

Unattended, safe, motionless, at the street curb in all kinds of weather, during any season of the year, for any desired length of time, then instantly, silently and fusslessly startable by the application of a mysterious invisible power; in line on a bridge or through the crowded street, winding always clear of danger, is this ghostly, silent little native electric auto of the city doctor of today.

Great speed and economy of power production, conditions usually obtained at the sacrifice of safety and comfort, are secondary factors of very small weight in the balance of choice with the auto wise doctor of automobile experience, who heretofore frequently sat beside the bedside of his patient, with his mind upon a questionable safety, his person and his clothes impregnated with a mixture of gasoline, oil, water and soot, his hands calloused, burned and scratched, until that necessary fine tactile sense was destroyed. These auto using machinists of the human body are finally coming to a very wise conclusion, viz., that the attention required by their autos is directly subtracted from the attention which they give their patients, and that the attention which they give their patients is directly commensurate with their welfare.

A STEAMER

was my first automobile venture. It took more than one year over 3,000 miles of New York city streets, with a total average cost of 7⅛ cents per mile and an unavoidable lay up of over 20 per cent. of the entire time to become convinced that this beautiful little steam engine, with its charming, evenly appliable and quick responding power, had an irremediably sensitive and very fragile water gauge, an irreparably troublesome burner, a superfluity of troublesome, always hot needle, check and safety valves, and various other hand soiling devices, all of which seemed to be done away with in

THE GASOLINE MOTOR CAR,

which was my next important venture. It took less than three months, over 500 miles of these same streets during the most favorable season of the year 1900, at an average cost of 21 cents per running mile and an average compulsory lay up of over 50 per cent. of the entire time, to learn that the then most popular American gasoline automobile (for the doctor's use necessitating an average of three stops per mile) was a grimy, unreliable nuisance; a back breaking, cranky ignition apparatus, a stinking, horse frightening, noisy exhaust, a filthy, spattering, wasteful oiling system, which clearly marked out the location of home, patients and friends. Subjugation to the dictations of an inefficient and extortionate concern who appeared to have control of repairs and the furnishing of parts made up a set of conditions which set me to thinking. It then occurred to me that the requirements of the public automobile cab service so nearly resembled the automobile requirements of the city doctor that I took the matter seriously and scientifically. I reasoned that I had here a well tried, established power criterion, which was the result of mature, expert conclusion and had stood the steady test of time and experience. During the summer of 1901 I placed my order for

AN ELECTRIC.

I have now (to date) piloted this little machine over 5,000 miles in all kinds of weather, during all seasons of the year, with a total average cost of 3¾ cents per mile, and a voluntary lay up of less than 1 per cent. of the entire time. This machine carries me about all day. It lights my residence by night. It furnishes the necessary current to operate a large 18 inch Ruhmkorff coil for X-ray work in my practice. It operates several small motors for fans, power, static machines, etc. In fact, I have been most agreeably and profitably surprised, and almost daily I am finding new uses for this little storehouse of energy which seems inexhaustible. Frequently have we towed our friends, but we have never yet been towed.

TO SUM UP.

Personally my ownership of automobiles (of which I have had four) other than electrics has been a circumstance of misfortune, born of inexperience. My former mistakes and past experiences have awoke in me a very keen appreciation of the positive superiority (for the city doctor) of the matchless, sparkless, yet incandescently luminous, cool, little native electric runabout, which, in the moment of crowding and danger, mysteriously and without visible effort suddenly develops many times its normally rated energy, gliding through silently and in safety, leaving its cumbersome, panting, grimy, foreign born rival in the entanglement of the crowded street accident vainly clutching high and low gears,

until the absence of that ill smelling gasolineous breath of exhaustion denotes that the doctor prays that even a crank's assistance will start up a spark of life, and cause it to pant for breath again.

New York State.

Three Years' Experience with the Automobile.

By Gregory Doyle, M. D., LL. D.

When the locomotive was first spoken of as a probability, many people would not even listen to such an innovation, and strongly opposed it, saying among other things that the noise and rumbling that would be created by such iron monsters would be unbearable and disastrous for the entire community. The opposition to their introduction was even fierce in certain parts of the country. So with the sewing machine; when first introduced it was laughed to scorn by many, and it became a common saying that a sewing machine that wore slippers was the only successful and reliable kind. The telephone was, for a time, looked upon as a mere toy, and only fit to amuse addle pated imbeciles.

The old saying, "Times change and we change with them," still holds good. Compare those times and notions with the accomplishments of today and behold how our progenitors were mistaken as to the ultimate success of the above great inventions. History certainly repeats itself in the matter of new departures and great inventions. Today the automobile is opposed and its advocates derided by a great many people, who really cannot explain their opposition more lucidly than to say they "never did care for new fangled fixin's, and don't like the consarned things anyway."

A more serious opposition is rendered by so called lawmakers who are forever trying to hamper automobilists with obstructive legislation. I am sorry to be forced to admit that senseless scorching and carelessness on the part of some men afford a plausible pretext for their persistent raids on the latest great advance in highway locomotion.

As to racing, I am utterly opposed to it unless confined to race tracks, or roads especially set apart to test the speed and power of the different makes of machines. The great majority of serious accidents are the results of senseless scorching on the highways, gross carelessness or ignorance on the part of the would be chauffeur. No man should attempt to run an automobile until he is perfectly familiar with all its parts and its limit of power. He endangers himself and others by trying to run it on cheek lubricated with gall. Guesswork will not do; the laws of mechanical science will not yield to whims or be coaxed into submission, as is sometimes the case with the old gray mare.

PUBLICATION OF ACCIDENTS.

Your publication of accidents is appreciated by all fair minded people. Much is to be learned by carefully reflecting on the causes of such mishaps. If any manufacturers object to such publication, it is through a fear of publicity that may affect their particular make. Right here let me say that some manufacturers are not as careful as they should be in turning out good workmanship, or at least the work is not properly inspected and tested before leaving the shop. For instance, the steam throttle on my carriage was so carelessly put together that the screw holding the lever became loosened and fell off when I was out on the road with a friend. When I wished to stop the machine I was unable to do so. My friend became greatly alarmed, and for a few moments I was at a loss to know what to do until my wits came to my rescue and told me to put out the fire, which I promptly did, and thereby prevented what might have been a serious accident. I might also have stopped the engine by throwing the reverse lever on the centre, but the occurrence being so unexpected I did not think of it for the moment. At another time the flimsy sheet iron straps that were supposed to hold the gasoline tank in place gave way, letting it drop down until sustained only by the supply pipe, which, fortunately, did not break. At one time I was stalled on the road by the pipes becoming clogged with carbonized gasoline as a result of the very small calibre of the connecting joints. This is a serious mistake that should be remedied. Makers say that if the pipes were larger the machine would be heavier. I for one would be very willing to have a little more weight added if it would enhance the value of the machine.

As to handling the automobile on the road, I have always been very careful, and as a result have not had the slightest accident, excepting as above recorded, and a few tire punctures, although I have been using a machine three years and have traveled many thousands of miles in it. I notice that many amateur chauffeurs act a good deal like novices with the camera; the latter want to snapshot about everything they see, good, bad and indifferent; so with the new automobilist; he is suddenly filled with a desire, no doubt created by his exalted position at the throttle, to outrun everything on the road, to cut flourishes and pigeon wings and to show off generally. It is the indulgence in just such monkeyshines that is responsible for a great many of the avoidable accidents. Scorching on the highways is another degree of lunacy which is the cause of many disastrous results. Persons who indulge in ragtime speed with the automobile seem to forget the great risks assumed for themselves and others; a loose bolt, a burst tire, a broken chain or a deranged steering gear might hurl the madcap into eternity, or, what is worse, might seriously injure some innocent pedestrian.

When the novelty of the automobile and its experimental stage shall have completely passed we will not hear of so many casualties due to verdancy and carelessness on the part of the operators. I say experimental stage, for the automobile, although rapidly improving, is yet far from a state of perfection. When the electric automobile will run 100 miles on a single charge and be reliable in all other respects, I think we will be as near perfection as any reasonable man could wish for.

GASOLINE VS. STEAM.

The gasoline automobile is fast coming to the front, and with a few objectionable features removed, will be a great boon to the traveling public. The present objections to most machines of that order are the noise, the smell and the vibrations. They are among the handiest, in other respects, for physicians, as they do not require as much attention as do steam machines; but when they get out of order, especially far from "home and mother," they are about as mysterious as boarding house hash. It takes an expert to find out the difficulty, and even he is often unequal to the task. They are often lugged home by the noble hay motor, with the once haughty chauffeur perched on his lofty seat with one hand on the steering handle and the other gently spread over his humiliated features.

When, after careful instruction and practical demonstration, I first began to run an automobile alone I felt as timid and nervous as a young colt before a screeching locomotive, but as time wore on and experience ripened, I found pleasure in my daily rides, and now, after an extended experience, I feel safer in it than I would behind a well fed horse.

The steam machine has some advantages above all others, as it runs more smoothly, is noiseless and free from odor and vibration. It is also a great hill climber. The power can be nicely graduated, and the sensation when riding is more pleasant than in any vehicle yet made.

As to the choice for physicians between gasoline and steam machines, much depends on the taste of the individual. When the gasoline machine is in good running order it requires less care than a steam machine. The latter, however, is easily repaired when out of order, and lacks the mysterious arrangements with which the gasoline engine is pregnant. An ordinary machinist can generally restore a steam machine to usefulness, but, as I have intimated, it requires an expert to start a stalled gasoline rig. Whatever machine a man has, it must be cared for and kept in good condition, as well as a favorite horse might be. After coming in from a run the steering gear, the brake and all the bolts, chains, pumps, etc., should be carefully examined, and in case of a steamer be sure that the fire is entirely out. After the machine is

nicely cleaned up it is proper to immediately put it in order for the next run or emergency call. The house for storing the automobile should be equipped with all the necessary facilities for cleaning, refilling and ordinary repairs.

"AUTOGORIUM."

I call the little house where my automobile is stored the "autogorium." The name is suggestive, euphonious, easily pronounced and easily remembered. I suggested this term over two years ago in an article published in THE HORSELESS AGE. Since then many have adopted the name and like it much better than "garage." This last term is anything but suggestive or euphonious. It has a disagreeable, raucous sound, and when spoken over the telephone or at a distance sounds so much like the word "carriage" that it often creates confusion as to what is really meant.

I have often been asked as to the origin of autogorium. If we cannot find all the roots in regular order, we can fix up the words out of stray fragments. For instance, we might say that "auto" means self; the meaning of the good old English word "go" is self evident to every scorcher at least, and the termination "rium" is suggestive of a receptacle for people, merchandise, etc., as auditorium, emporium, natatorium, et al.

LESSONS OF THE ROAD.

The articles in THE HORSELESS AGE on "actual experiences on the road" make very profitable reading. I have learned more from them than from all the theories that have been advanced regarding the best modes of handling automobiles, the surest way to avoid accidents, etc.

Good roads are almost as indispensable for the automobilist as steel rails are for the locomotive engineer. The unpaved streets in our cities are much worse than the country roads, and are often nearly hub deep with mud and are the dumping ground for broken bottles, rusty nails and débris of every description, so destructive to pneumatic tires. This abuse should be looked after by the municipal authorities of every city.

The day is not far distant when automobiling will cease to be a novelty, and the number of horses contaminating our streets and wearing out our pavements will be greatly reduced, thereby lessening expense for taxpayers, who have to spend enormous sums yearly to keep the streets in repair and in sanitary condition.

A grand revolution in travel is certainly at hand, and the present generation will live to see improvements in locomotion developed to a degree far surpassing the grandest accomplishments of the present day.

A Year's Experience with Horseless Carriages.

BY DR. CHAUNCEY CAREY.

November 1, 1901, I bought a three wheeled, air cooled gasoline runabout, and by April 1, 1902, I had driven it about 2,000 miles without a single serious mishap. Of course I had to contend with some functional troubles that belong to horseless vehicles. The manufacturers furnished me with most explicit directions concerning its running and care, dwelling on thorough lubrication as a matter of paramount importance, besides especially favoring me with a blue print of the engine. I studied the little machine as you would study a lesson in geometry until I had completely mastered every detail. I learned its minutest anatomy and its physiological sounds until the slightest deviation would aid me in locating the most trifling derangement of the valve setting or ignition apparatus. The result was most gratifying, for I was never towed in, and never walked a step on account of the machine's inefficiency. The three wheeler is one of the most practical and reliable runabouts for the city physician that I know.

Of course the little machine was severely criticised on account of not having another wheel, but that prejudice was entirely overcome after it had been seen on the streets every day all winter, when every other machine was in storage. I took drives of 8 and 10 miles into suburban towns every week, sometimes when there were 2 feet of snow. The principal advantage of the three wheeler is that nearly four-fifths of your weight is on the traction wheels, which insures greater traction through mud, wet snow and on ice, besides reducing skidding to a minimum.

The wheel base is short, and it does not ride as easily as a longer carriage. Then the lateral movements are greater than in a four wheel vehicle. Otherwise it had manifold advantages. It controlled easily in a crowded street or in an alley. When you met a frightened horse, vis à vis, you could turn around in your own length and away, thereby averting, possibly, a serious accident.

SIGHING FOR OTHER WORLDS TO CONQUER.

Naturally enough the American is never satisfied; and after having mastered square root he hurries on into cube. The three wheeler had become monotonous and unexciting. You gave it a quarter turn, and whether the thermometer was 8° below zero or 90° in the shade, it would invariably go. You make your calls or take a pleasure ride and come back, turn off your spark and gasoline, and resume your office duties. It ceased to be spicy. So one bright, springtime day, I sold it, heartlessly, as I have seen the faithful old horse sold. After floundering around a few days among the glittering possibilities I purchased a four wheeler. It was a handsome, slim, sleek and slender racer, a typical thoroughbred in its contour. But it was too slim, and I came to grief. My first trip was a 10 mile drive and return over a beautiful macadam road. It was a dream. I never had had such a delightful and fast ride. I came prancing into the barn, and, upon applying my brake, which seemed inefficient, pushed my reverse by into the high speed and went through the barn, tearing slivers off the laundry and up two steps into the kitchen, with a dull and sickening thud. I finished landing on my feet by picking myself out of the screen door. My son and I pushed the lovely but somewhat defaced machine back into the barn. The wind was nearly out of my sails, but I managed to raise enough to christen it.

Whose fault was it? The makers, of course. Are they not supposed to make them "fool proof"? Suffice it to say I fixed it so a horse wouldn't pull it by again, by tightening the reverse band. This accident was my own fault, although the manufacturers had not at this time sent me directions. In the first place I had so completely familiarized myself with the three wheeler that I was a victim of over confidence. Now here is a point well to be remembered, the difference of machines. Having no reverse on my former machine I was not prepared for the reverses that met me with this one.

The next day I screwed up my courage and took another ride. It was pleasantly uneventful, as was the next and the next. The second week I was stalled two blocks from my office by a leaky atomizer float. I had it soldered by a gasoline engine expert and we started for a ride one hour before my office hours (10 a. m. to 4 p. m.) began. The car ran beautifully for 2 miles, when it stopped abruptly with a

BENT EXHAUST VALVE ROD.

I returned on a trolley car while he straightened the rod. The car arrived at 1:30 p. m. This was also my fault. The rod ran tightly and should have been more thoroughly oiled. There might be a question really as to the fault.

The next week the hill climber slipped, and instead of tightening the band and lubricating the gears thoroughly, I gasolined the band and unavoidably the gears. The consequence was stripped gears and three days more for repairs. My fault, directions or no directions. The next week a burst and collapsed tire 18 miles from home. Drove home on rim, ruining tire, rim and mud fenders. My fault—state of frenzy. Next week 9 miles from home and 2 miles from a little town, the right hind

AXLE BROKE OFF

near the hub while passing a dangerous place in the narrows. Loose wheel ran off the bank and nearly down into the river. The machine stopped of its own accord, as the brake would not hold with one wheel off. Here's an argument in favor of having a brake on each hind wheel. My companion—a dentist, and owner of a three wheeler—and I alighted. The picture was disappointing to me and he saw evidence of it in my countenance. After a few minutes of absolute silence he said:

"Well, doctor, I told you that you would come back to a three wheeler." His humor amused me so much we started happily in quest of the missing wheel, which required twenty minutes to find. Afterward we walked back to town and procured the services of a farmer with a team to tow us back. In going down a long hill the machine ran into his wagon, notwithstanding the skid underneath the axle, and barked it wofully. I felt then like the fellow who had been out to a champagne supper—all he wanted for breakfast was a "kind word and an orange."

IGNITION TROUBLES, TOO.

Three weeks after a similar fate met the left hind axle spindle, and a little later both steering knuckles gave out. These parts were all replaced by the company and were made stronger. I was stalled again by an unreliable spark coil and by an inefficient buzzer. The latter has no place in a horseless carriage. A few days after the engine worked badly, being badly gummed up, owing to poor lubricating oil. Lubrication is an important feature in a gas engine. I use nothing now but valvoline. My next trouble occurred when a

RADIUS ROD LOOSENED

in a critical place in the road and dropped, nearly upsetting me. It should be securely fastened and locked. I was stalled 19 miles from home one dark, rainy night on account of mud flying into machinery, clutches and atomizer. Cause, inefficient mud guards on front wheels. I have a pair on now that are large enough for wings to a flying machine.

LEAKY TANKS AND RADIATOR.

I have thought many times, when will the evolution of this machine cease? Gasoline tank sprang a leak and delayed a trip four hours. Radiator sprang a leak in an interesting part of a trip. Water tank also sprank a leak on another trip and short circuited my batteries. The cam gear wheel was stripped by a stone being thrown into it by the front wheel. This defect was remedied by the new mud fenders. Several less important things have occurred to vary the monotony that characterized my former experiences, which, as I thought then, had grown tedious.

BUYS AN AIR COOLED FOUR WHEELER.

In my disappointment and desperation I bought a second hand four wheeler, gasoline, air cooled—the same make as the three wheeler which had served me so well. I wish I might mention the name of the gentleman of whom I purchased, because I bought this car from his own personal description, "unsight and unseen," and it's a finer car than I bought. He added a new tire and all of the accessories he had accumulated in three or four months. Long may he live! And here comes another thought: Automobilists are not only royal, but loyal.

Well, with the new machine, to satiate my longings for an occasional uninterrupted ride, I went along with my improvements and reinforcements on the unfortunate car. And today it forcibly reminds me of a little patient I had over twenty years ago. She had measles, whooping cough, chicken pox, scarlet fever, diphtheria and ended the second year with articular rheumatism. But we—the ever faithful mother and I—stuck by her until she thoroughly convalesced and outvied all of her classmates, both mentally and physically. In justice to the makers of my machine I would say that they have promptly and cheerfully replaced every defective part, and claim that my experience, which truly is not overdrawn, is an absolute exception.

GENERAL DEDUCTIONS.

From my foregoing practical experience with an ill fated horseless wagon you would naturally deduct the following: If you are not mechanically inclined (I can scarcely imagine a successful physician and surgeon who is not) I would advise you not to buy an automobile. It must certainly have the most intelligent and personal painstaking care if you are to derive pleasure and supreme satisfaction. When you do buy a machine procure one that is high priced, which means efficiency, strength and durability. Then study every detail and become so completely its master that you will be confident and restful while driving it. Readers of THE HORSELESS AGE who have read Robin Damon's articles cannot help being edified and enlightened—because they are composed from plain truths, born of a ripe experience, and tersely and comprehensively written.

At present I do not feel that I shall ever own another horse, at least until I am deep into the sere and yellow. I have had too much pleasure to forego automobiling. Of course, I have had my troubles, but they were not serious and really awakened my old time "sticktoitiveness," and with a year or more of rich experience with a gasoline engine I do not feel that I shall ever be stalled again, unless some essential part is absolutely broken. With perfect ignition, 76 per cent. gasoline (no lower), valvoline gas engine oil, and a reliable carburetor, you can ride and ride to your heart's content.

THE 75 CENTS AN HOUR GASOLINE EXPERTS.

I would emphasize a point in Mr. Damon's article of December 3, referring to the "75 cents an hour gasoline expert." He was under this expert's care for three days and finally set his own igniter points to get out of town. Every owner of an automobile should understand this point as well as valve setting, if he does not want to become a victim of this expert. I say this with regret, but it is true. I saw one put the piston on the crank shaft and reverse the exhaust and compression strokes and he didn't know why the machine wouldn't go. This is why I claim that a physician, versed in auscultation and percussion, is the man of all men calculated to get the greatest good out of a horseless carriage.

THE PRACTICAL SIDE.

What the expense of running and maintaining automobiles would be to the general practitioner of medicine I could not state very accurately, as I make few calls and have used my machines almost entirely for mental and physical recreation. I have, however, used them liberally for that. One of my cars was one of the first the factory turned out, and I might say with conservatism was a veritable failure, especially regarding details. Consequently the expense accruing from it has not been inconsiderable. Notwithstanding, I am under the impression that my automobile experience has not cost much more than the maintenance of nice rigs. My disappointments and annoyances will serve as stepping stones to better and more economical results next year, when I anticipate a great deal of pleasure. Last year people were hungry for fine appearing cars at a moderate price, and were woefully imposed upon by manufacturers. This year, 1903, it will be radically different, and much credit is due THE HORSELESS AGE for so impartially disseminating automobile experiences. This is a progressive age, no one will deny, but the fashion changing idea in automobile construction will not prove to the inventors and manufacturers as remunerative as they imagine it will. You can change the style of wearing apparel often, because the expense to the wearer is trivial compared to that of an auto. I very often hear this remark: "When they get the automobile past its everlasting, ever changing, experimental stage, I'll buy one, but I cannot afford to buy one every spring." The prospective purchaser, or admirer, of an auto, as a rule does not understand one machine from another; and, because the styles are ever changing, he assumes that the vital parts are, of necessity, also being changed. Every city and country road is dotted with the little four wheel gasoline runabouts. I haven't one because I wanted a heavier carriage, but I regard it with veneration, and they will have to grow them fast this year to keep the market supplied. Why? Principally because the man who had one last year will not be ashamed to run it this year (style not materially changed), and his neighbor seeing him satisfied and happy with his last year's machine is so impressed he, too, buys one. It is standard, and when you see it from year to year practically unchanged you naturally infer that it has passed the stage of evolution. If a company's machine is not matured, why not keep it in the shell until it is? I favor improvements, but I believe that every car in the main should have its original individuality preserved, so that a customer would not feel from year

to year everlastingly conscious that he was "setting in a last year's nest." The sacrifice in selling second hand machines and buying new ones is too great for any but the millionaire, and I would suggest buying a standard car, learning it, keeping it in first class condition and sticking to it until it appears too antiquated. If the makers should alter its features until its owner would scarcely recognize it, then I'd sell it and procure one whose type remained more permanent. I have not referred to steam machines because, during the early stages of auto fever, while riding with a friend in one it caught on fire. It was not serious at all, but frightened and naturally prejudiced me. We all know they are powerful and reliable, and not in the minority.

In conclusion, I would advise any business or professional man to buy an automobile. It will improve his health, and by making him live longer be a good business proposition. To me automobiling is a fascinating and exhilarating recreation.

The Country Doctor's Automobile.

By Dr. C. A. Shepard.

I approach this subject with fear and trembling, for "doctors differ" in their views in regard to the horseless carriage almost as widely as in medicine. It is not so much a question with them as to whether they shall have "an" automobile or not, but it is the kind of one to have that bothers them.

Physicians are taking to the new order of things perhaps even more quickly than any of the other professional or business men, as we can readily see by glancing at the membership roll of the prominent automobile clubs. This is as it should be, for there is no class that can appreciate the comforts of this style of locomotion more than physicians. It is he who realizes what an advantage it is to be able when a hurry up call comes to don his hat, coat and gloves, jump into his carriage, pull the lever and be off before he would have had time under the old order of things to get the harness on his horse; or, on a scorching summer day, with the thermometer standing near 90°, to be able to travel 10 or 15 miles an hour, which with a horse means its death.

STARTED WITH A STEAMER.

It fell to my lot four years ago to become the owner of a steam carriage. It was one of the best of its kind and I thought I had the best there was on the market. I soon caught on to the running and care of it, and I thought I didn't know what practice had been before. I could cover more ground in less time than with a horse, and as a result was not so tired and had more time with my family.

For awhile everything went along smoothly, until one day, having made a couple of extra calls over heavy roads, I found myself with an empty water tank and a scorched boiler. As everyone who has had this happen knows—and every owner of a steam carriage has told me of the same misfortune—the boiler has to be taken out, and if you have no facilities for expanding the tubes in your town it has to be sent away. I got it back in about two weeks and put it together. Then the throttle commenced to leak and that had to be packed. Then the water feed pump had the same fault. Then I blew out the cylinder packing and after all these little troubles the tires began to bother me. I had two punctures in quick succession.

CHANGED TO GASOLINE.

I disposed of the carriage and next tried a four cylinder gasoline runabout. The mechanism was complicated to me and it was some time before I understood how to run it properly. My wife and I started for a little trip into Canada, when apparently without cause the machine stopped in climbing a grade, and despite my coaxing and my wife's scolding and belittling of this new way of traveling it would not go. Finally after working over an hour it suddenly started and we reached our destination. When we reached home I shipped it to Boston, where it was sold.

Then I tried a single cylinder runabout weighing 800 pounds. While with the steam carriage I had to heat a torch in the fire, attach it to the fire pot and wait five or ten minutes to get up steam, with the gasoline carriage all I had to do was to jump into the carriage, turn the handle (it could be turned from the seat), throw in the clutch and move off. It would not only run further with less consumption of fuel than the steam carriage, but had the advantage of having nothing but the road to watch, while on the steam carriage you had a steam gauge, an air gauge and a water glass in addition to the road. I appreciated the steam carriage as an improvement over the horse, but I also appreciated what an improvement the gasoline vehicle was over the steam.

However, as my carriage only weighed 800 pounds and I was pushing it through mud and heavy sand I soon began to have trouble. First, there wasn't sufficient power to climb steep grades, especially with muddy roads. It was equipped with the jump spark and I had lots of trouble there, too. I tried various makes of sparking plugs, but they would only work satisfactorily for a little time.

AN EVENTFUL TRIP.

A friend and myself left Toronto, Canada, to ride around to Lewiston, a distance of about 90 miles. Leaving the city at noon, we made the first 16 miles over good roads in an hour. When 2 miles farther the wire on the speeder broke—of course, in the worst place it could have, just where it passed through the framework beneath the flywheel. Everything was hot, but I got a blanket from a farmer's stable, laid down on my back and after about half an hour's delay got it fixed. Not having any wire with me we appropriated a piece from a nearby fence.

As we got near to Hamilton we encountered some very steep grades which the machine would not take without one of us giving it a helping hand. Two miles from Hamilton, as we started up a grade, the carriage stopped, but the motor kept on running. Thinking the clutch had slipped I tried to tighten it, but that wasn't at fault. I soon discovered that our trouble was in the high speed gears, and sending my friend into the city to get some help to tow us in I sat down to wait and think of the glory of automobiling. He returned in two hours and we put up at a livery stable for the night. The next morning, after an examination at a machine shop, we discovered that the high speed gears, which were made of wood fibre, were all stripped. I then had a brass casting made and new gears cut from that. This delayed us two days.

After getting the carriage together again we left Hamilton at noon and hadn't gone far when the chain parted. Wasn't this enough to tax the patience of Job? We got in a new link which I had with me and if we didn't cover the last 10 miles of our journey in quick time then I don't know anything about traveling. We made the natives stare all right.

A BROKEN CRANK SHAFT.

Then my wife and I thought we would take another trip. Leaving my house we made the 26 miles to Buffalo in one hour and 20 minutes. The distance from Buffalo to Hamburg is 14 miles. We made this in thirty-three minutes. This was over the new macadamized road. As we were passing through Lawtons I heard a pop and knew that I had a puncture. It was in a new tire, too, that had been used only for this trip. There was no place to mend it there, so I went on to the next town. Just before arriving there the carriage stopped. I found that I now had a broken shaft to deal with. Walking the ties in search of help, leaving my wife and little one sitting by the wayside, I soon had a man and rig to tow us into Gowanda. Here we took the train home and sent a man after the carriage the next day.

After getting it apart they found that one of the oil feed pipes had been stopped up with solder, so that part of the shaft was not getting the proper amount of lubrication. Why it should have broken at this time and not before I have been unable to find out.

I then got me a heavier carriage weighing 1,800 pounds, single cylinder, using the make and break spark instead of the jump spark, and from the experience I have had with them both I must say that the make and break has given me the most satisfactory service. It has a positive contact and is not influenced by muddy roads, as is the jump spark. This carriage has given me entire satisfaction, being heavier than

A New York State Doctor Who Keeps Going the Year Around.

the ones I had previous, and thus standing the strain and jars better.

THE MATTER OF COST.

Of course, we will have expenses. Any piece of machinery is liable to get out of order, but an automobile disaster is always exaggerated. Did no accident ever happen to the horse and rig? I am amused at the prominence some papers give to automobile mishaps.

Any man who can afford a horse can better afford an automobile. Any service which a driving horse can give can be better rendered with an automobile, more quickly and more economically. The horse is affected by the heat and cold and must be protected. The automobile is superior in all these conditions. If an automobile is cheaper in constant service, what about the horse which is idle half the time? The horse expense is the same whether idle or at work.

THE CHARM OF AUTOMOBILING.

The real sport is not in riding; not in going from place to place, though that is a splendid feature of it. One would weary of that, as he wearies of driving. It is the pleasure of operating—no one can weary of that. Not all of us care for speed, but all delight in operating the carriage, and feel it answering to every thought and wish. Another delight is in touring. The auto never wearies. It will go from daylight to dark and be just as fresh at the end as in the beginning. No hill is too steep, no weather too severe.

The era of experiment has passed. Even petty troubles are now rare to the man who will thoroughly study his machine and keep it in good condition. Accidents which would injure the occupants of the carriage are about impossible from the machine itself. They can only occur from the carelessness of the operator.

WHAT THE DOCTORS WANT.

We country doctors want a machine that will go over any road, in any weather, and that will climb any hill. We want a vehicle equal to any emergency, and any requirement of speed. A machine instantly adaptable to any condition and easily controlled and looked after with a minimum amount of care. We want a swift, silent, comfortable vehicle, one into which we get with the feeling that we are going to return as easily as we start out, and the manufacturer who caters to the demand for such a carriage can run his factory full time in filling physicians' orders.

IMPROVING THE LUBRICATING MEANS.

Most all of us have noticed that when a touring car or large automobile comes to a stop and remains standing for a short time there is a puddle of oil and water formed under it. When I got my last carriage I noticed that the same thing happened with it, and after having it for a while I set about remedying it. This carriage was equipped with oil cups that had no shut off, so that the oil was flowing whether the carriage was at a standstill or moving. I took off the oil cups, which were about 3 inches deep, cut them off about an inch from the bottom, so that the feed pipes were not disturbed, had made a new oil basin, the same size and length and about 2½ inches deep, and fastened to this a shallow lower basin at each end. Then I had three small pet cocks put in between the two basins, so that the flow of oil could be regulated. A screw cap in the upper basin served for filling and for examining the amount of oil in the basin. By placing a little waste in the lower basin it served to retard the flow of oil. This arrangement resulted in a great saving of oil. Previous to this I would have to fill the cups every 20 miles and now only once in a hundred. When I come to a stop I simply have to turn the valves and shut off the oil. I see some of the new models have the oil feed regulated.

CARE OF MACHINE.

In regard to the care of carriage, I give mine the same care that I have given in the past to my stanhope. When I come in from my rounds if the carriage is not muddy I put up the top and brush out the dust. If muddy I turn the hose on it, using a sponge and drying with chamois. I have found it easier to do this when the mud was fresh than to wait. Of course, there are times that I am unable to attend to it at once, owing to waiting patients etc., but I always take the first spare time I have to attend to it. When running the carriage regularly I give the gears and bearings a thorough cleaning with gasoline about once in two weeks to eat out the gummed oil, wiping dry and then oiling thoroughly by hand, at the same time examining for loose nuts and screws and keeping things tightened up. I look after it myself, then I am sure when I start out that I have no one to blame if anything goes wrong or anything is forgotten. My wife often asks me what I am working at the carriage for all the time, but there is a fascination in attending to it.

REPAIR EQUIPMENT.

I have a large room in my barn in which I keep my carriage. In the centre I have a pit 4 feet deep, 3 feet wide and 6 feet long, guarded on each side with 6 inch scantling which prevents my getting the wheels of the carriage into the pit if I should come into the barn pretty fast or get a little close to the edge. This pit has enabled me to get under all parts of my machine without lying on my back and having oil or water dropping in my face or eyes. In one corner of this room I have a work bench with vise, tool chest and a complete equipment for doing my own repairing if not too serious. Shelves nearby serve for oil and gasoline cans, boxes for waste and other supplies. I have acetylene gas on my premises and have the light throughout my barn, but I never fill or attend to my machine by gaslight, preferring daylight as being safer.

PUTTING IT UP.

As our roads in the fall become very heavy and rough I always put my carriage up in the fall. I could use it longer than I do, but it would mean more work for me to look after it and harder work for the carriage. I empty all tanks, clean the gears, let the air out of the tires and put away the cushions.

A word in regard to the care of the tires.

A few minutes spent looking over them after a trip will more than repay you for your work and time. Whenever I am cleaning up after a long run, and also at other times, I go over each tire carefully, looking for small cuts in the rubber. If these are immediately covered with rubber cement on the under side and a piece of tape or cloth tied tightly around the tire until the cement sets it will save lots of punctures. Several times in running along I have struck stones which have not damaged the tire, but bent the steel rim. This leaves a place for sharp stones and pieces of wood to enter and should always be straightened.

The Doctor and the Automobile.

By J. H. Tamblin, M. D.

"Is the horseless vehicle practicable for the use of physicians in their everyday practice and will it take the place of the horse in a satisfactory manner?" is the question I have been oftentimes asked by physicians. During the past year I have received many letters of inquiry, some of a general character and some asking for minute details.

The question is rather a hard one, for the reason that conditions vary so much. I know of but one way to give anything like a satisfactory and intelligent answer, and that is to relate my own experience in the use of an automobile in my practice for the past three seasons.

Three years ago I purchased a steam carriage. Having had some experience in the use of various kinds of machinery during my younger days, I took the throttle with considerable confidence of success.

My first trip was from Watertown to my home, a distance of 14 miles, which was made without trouble. On arriving home I ran my machine into my carriage house. It being the first steed of the kind in town, my friends and neighbors rushed in to inspect it and render a verdict, as many are wont to do without first hearing the evidence. My faith in my ability to handle it being quite strong, I determined to demonstrate it to my audience, and my first manœuvre was an attempt to turn the machine around, and desiring to have my friends understand that my steed had life and could propel itself, I reversed the engine and opened the throttle, as I thought very carefully, when the thing, greatly to my surprise and chagrin, sprang backward so quickly and with such force as to make an extra opening in my carriage house, very much to the amusement of my audience. Some said my horse was not properly broken. Others said, behold Balaam and the ass! One bystander signified his inability to discern which was the ass, the operator or the auto. I felt that remark keenly and adjourned my exhibition without delay.

I kept at the work of learning, and after several weeks felt that I was master of the situation. Having occasion to visit Sackett Harbor, a summer resort 25 miles distant, I resolved to go there by auto. My friends who were to make up the party went by railroad. True to my resolutions I started out, and made the trip overland by automobile and without trouble. My cup was now full of satisfaction and my mind full of confidence. When ready for the return trip I asked a lady friend to ride home with me. We started homeward with flying colors. Everything went well for about 5 miles, when without warning my steed came to a sudden halt. My steam gauge told me I had no steam, and more careful investigation disclosed the fact that there was no water in the boiler, and the burner and lower part of the boiler were red hot, or hotter.

The question then was, How shall I get home? After pushing the dead steed for a mile or more, a good Samaritan came along and took me in tow. My readers who have had similar experiences can fully appreciate how I felt coming into town at the end of a rope. When I saw people along the road whom I knew I always had business gazing in the other direction.

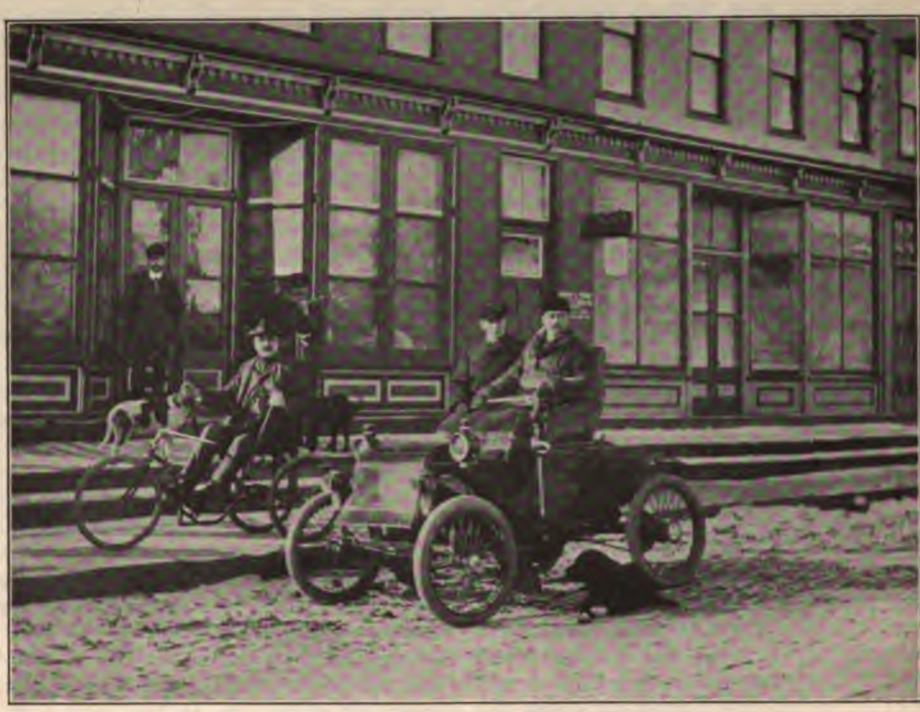
Variety is said to be the spice of life, and I felt that my stock of spice was large. As time passed on many annoying things happened to me, but toward the close of the season a better state of things arrived—the auto and its owner became better acquainted—and it was with regret when in November I put up my carriage for the winter.

At last the long looked for spring came, the auto was cleaned up and again put in commission for the work of season No. 2, during which time things ran along very smoothly. For six weeks I only used my horse three times. Having placed good lights on my automobile, I made it carry me both night and day, and at the season's close I regretted very much that I must from necessity resume the use of the horse and put away my auto.

BUYS A GASOLINE MOTOR.

During my second and third seasons many seeming improvements were brought out, some of which I found to be of value and practical utility, while some were a perfect nuisance. I tried to keep pace with the times, and as various gasoline motors came to the front for use in horseless carriages I determined to try one. After deliberation I purchased a runabout with this kind of motive power. I tried it thoroughly on country roads for several weeks and found that the machine was good for the work for which the makers recommended it, viz., "as a runabout in the city," but that it would not stand the hard service of country roads and usage. I therefore disposed of the runabout and continued my search for some machine that would fill the bill for all round work as nearly as possible.

By a friend my attention was called to a medium weight air cooled machine. So I journeyed to the city of its manufacture, and after thoroughly inspecting the mechanism of the vehicle I purchased one, returned to my home and anxiously awaited its arrival at the railroad station. When it came I took it from the car and began using it in my daily work, both night and day. It gave such satisfaction that I sold the steam machine and am now driving the gasoline. Doubtless there are many good gasoline motors now in use in horseless vehicles. For the physician's use in everyday work I would strongly advise the gasoline motor, assuming that it be a good one. A machine with an 8 or 9 horse



Using An Air Cooled Motor At 8° Below Zero.

power motor has plenty power for any country road with only two persons in the carriage at once. I would advise my brother physician who thinks of buying an auto for constant use in his practice not to make the purchase from what he reads or sees on paper, but rather go to the maker and thoroughly inspect the vehicle in detail before giving up his cash for it. I am satisfied from an experience of three years that an automobile, if it be a good one, is the doctor's best friend; while a poor one would be an enemy, and it might spoil his hopes of heaven if he ever had any (I suppose some doctors do have).

Buy a strongly made yet simply constructed vehicle, with a large gasoline tank (not less than 10 gallons), easy springs, 3 inch tires, wide seat, spring cushion and back, and plenty of carrying room.

Before trying to run the machine far from home familiarize yourself with its mechanism in every detail; do not try to race with your machine, but use it with a little common sense and I am confident that your verdict will be the same as the writer's, viz., the horseless vehicle, properly used, is the doctor's valued friend and helpmate.

Those who began to use the horseless vehicle when it first came out labored under a great disadvantage for the reason that the makers were new in the business, and their work was in the experimental stage in nearly every detail. Now the defects have to a great extent been rectified, and the machines of the coming year will be far superior to the former ones. In addition, the good roads enthusiasm is spreading, and many towns in the State are availing themselves of the aid offered by the late law, and the result must be better roads from now on, which will be a boon to the users of automobiles. There is and will be for some time a prejudice on the part of some against the use of the auto on our public roads, but as time rolls on the dislike will wear away, the same as it did when bicycles came.

Many people, and especially the farmers, were very bitter against bicycles and those who rode them. Now many of the farmer boys have them. The automobilist can do very much toward removing the strong dislike now existing against autos by using them in a reasonable way when on the highway. One fool operator can do more harm than a dozen reasonable and careful operators can overcome. The crank who goes out upon our public roads to scorch should not be allowed to use an automobile. If racing must be done let it take place upon a track made especially for the purpose. It is fortunate for all that the idea of racing along our public roads is fast becoming unpopular with the better class of automobilists. This will do very much toward putting a stop to the fast running that has been indulged in by some during the past two years.

New England.

The Motor Carriage for Physician's Use: Its Advantages, Its Pleasures, Its Shortcomings.

By Thomas Kittredge, M. D.

That the motor carriage is a practical vehicle for most physicians has been demonstrated beyond question, and in a year and a half's experience I have proved it to my personal satisfaction. But I also believe that for a few physicians the motor carriage of today is not practical, although I think this applies less to physicians than to any other class of men, for the former, as a rule, are rich in expedients, are trained to act in emergencies, and from the very nature of their calling have more or less of a mechanical bent of mind. They also have an extensive experience on the road and for this reason can use the motor carriage to better advantage than some others.

There are a few people, not physicians alone, who have not the knack and who never would have the patience or enthusiasm to put up with the petty (to say nothing of the major) annoyances that are inseparable from the mechanical thing.

That the time will ever come when the motor carriage will be so constructed that the physician, or any one else, can make his purchase, place it in his stable or garage, expect it always to go, without annoyances and without mishaps, I do not believe. No machine has ever been constructed or ever will be that can be operated successfully without constant inspection, intelligent supervision and frequent and careful overhauling—not necessarily by the hands of the operator himself, but under his direction.

I do not believe a man can use a motor carriage successfully or satisfactorily to himself, to the makers, or to those who are observing him, who has not the enthusiasm to know his carriage thoroughly, its mechanism and the principles that govern its action; but I do believe that the motor carriage has reached a point to enable one of ordinary intelligence, who will make himself thoroughly familiar with his carriage, to use it with great satisfaction.

The use of the motor carriage every day throughout the winter in our northern climate seems out of the question. From December to March there are many days when it is practically impossible to use one as at present constructed. While it runs very well in new snow up to a foot deep, in old snow that has thawed and frozen again and is hard and rutty and lumpy with huge piles on each side of the street, it is certainly no comfort to ride in it and it is too great a strain upon it to make it worth the while.

After a sleet storm, about two weeks ago, our streets were a glare of ice, a none of my horses had been shar they could not step outside the stabl then my steam carriage went very r Ice, as long as it is dry, is excellent t over; when it is wet, it is pretty sli I used my carriage during the foreno our last heavy snow storm and it went well indeed. The broad tires packed the snow and even with the snow 8 inches deep the carriage went almo fast and rode just as easily as or ground.

OPERATION.

Motor carriages are easily man This, I think, speaks volumes fo thought and care of those who have oped them and brought them to the p state of usefulness. That such compl pieces of mechanism can be made matic in the working of so many of parts, and the whole thing brought such perfect control by the moving o or two levers and the application o brake, is surprising.

No intending purchaser need hesita the score of management, as I think one can learn, with little difficult operate any of the carriages now o market—although I know of one man an intelligent one at that, who purc a gasoline vehicle of good make, was oughly instructed in its care and ma ment, but who has actually given and the whole motor business becau could not master the art of turning o off his power and using the brake a proper time.

At present it seems to me that the craze is the bane of the whole busine think it will be a long time befor motor carriage can be built that c run at railroad speed, long distances, all sorts of roads, and not need co "tinkering."

Every carriage sooner or later dev individual idiosyncrasies and these m studied and puzzled out by the ope himself. A short time ago I began t a slight vibration in my throttle when my carriage would reach a c speed. This at first was so slight as barely perceptible, but gradually incr until it became alarming and so loud enough to be heard some dis away. Instant shutting off of steam v stop it and it would not recur until ning smoothly at pretty good speed on roads. It did not occur on hills or v the engine was working very hard.

It persisted for weeks and was ver noying, as well as alarming. I cons everyone that I thought might know no one could tell me what it was. I several experts out to ride and the clared they had never known of s thing before and did not know wh could be, but seemed all to be of the ion that it was something pretty ba seemed to me by the sensation con to my hand, that it had something with the slides in the engine and I

made up my mind the trouble was there or in the steam chest.

One day a first class mechanic working upon an improved lighter I had installed upon my carriage, suggested that the chain be tightened. The chain, a heavy roller one, did not seem at all loose, in fact my man had been warned only a short time before by an expert worker upon steam carriages, that he must not keep too tight a chain, as it dragged on the engine. Well, that chain was tightened a very little and that was the last of the vibration.

I now have a slightly wheezing cylinder on my engine. It has been repeatedly looked at, been repacked, the cylinder oil feed disconnected, examined and found to feed sufficient oil, and yet my cylinder wheezes. The noise is slight and only heard when running very slowly. The engine does not act or feel as if it were not getting enough oil. I hope some day someone will come along and tell me what the trouble is.

Several times lately I have had my fire go out when running (not when standing with the automatic shut down). I had supposed this could not occur when the carriage was standing and that when running with the forced draught (exhaust) it would be impossible, but it happens, and so far no one can tell me the cause of it. It is a slight annoyance as it is quickly relighted by a match, but I should like to know what causes it so that it may be remedied.

CARE.

I have been surprised at the comparatively little care that the motor carriage requires, but the care must be of the most intelligent kind. Perfect cleanliness I think is the keynote of the whole thing. Machinery and dirt are absolutely incompatible. A great many carriages that I see are very far from clean, either in the mechanical part or in the carriage—and yet they seem to go very well.

Upon second thought I should put lubrication before cleanliness, and by lubrication I mean proper lubrication—lubrication with a proper lubricant so applied that it will reach every bearing and every part of those bearings equally. To do this the lubricant must be of the right consistency, the oil holes must be free, so that the oil can easily get to the bearing surfaces, the bearings must be free from "gum" and grit and the oil must be used freely.

The many mechanical or so called multiple oilers, while a great convenience, unless carefully watched and constantly adjusted will lead to faulty lubrication, unequal wear and heating of bearings and a gradual increase of noise.

Cylinder lubrication is one of the problems of the day, and about as difficult to solve as the tire problem. The so called gravity feed cylinder oil cups seem to fail, sooner or later, particularly if a heavy oil is used or if graphite has been incorporated into the oil. That a pretty heavy oil is needed for cylinder lubrication I suppose everyone believes. One of the various forced feed cylinder oil cups seems to be necessary to satisfactory cylinder lubrication.

The care that a motor carriage can receive in one's own stable has proved amply sufficient; in fact, the cleanest and best running carriages that I know of are kept in private stables and taken care of by men who are not trained mechanics. If one has a carriage of good make, will take good care of it and use it with discretion and moderation, I think it will last a long time.

ECONOMY OF USE.

I am aware that I am now on debatable ground, upon which there is a great difference of opinion, and that there are many men of many minds upon the subject. But I think most of those who have had an experience of greater or lesser extent will agree with me that a physician well equipped with one or more motor vehicles will be able to operate them much more cheaply than he can do the same amount of work with horse drawn vehicles. What constitutes the proper equipment of a busy practitioner? If he simply means to add a motor vehicle to his stable, he will be able to dispense with one or more horses and yet be able to accomplish more work. If he intends to give up his horses entirely and has only one self propelled vehicle, I think he will be badly handicapped, and there are times when I feel he will be disgusted with the whole motor problem. When they are in proper order and work smoothly and well they are a delight to any man; when the reverse happens (as it is bound to do occasionally) they are the most exasperating things in existence.

The motor vehicle to take the place of two or three horses would be pretty constantly on the go, and would cover a good many miles. This means a great and constant strain upon the carriage and a pretty rapid wearing of all bearing parts. While there are carriages built today that can meet these requirements, yet the best of them require constant supervision, frequent repacking of stuffing boxes and the taking up of lost motion. These things are inseparable from the use of self propelled vehicles, and when they have to be done, take time, and it is inevitable that they may have to be done at just the time the carriage is needed in an emergency or for a long day's use. Then, too, machinery will occasionally break, and when it breaks the carriage is out of commission until the break can be repaired or the part replaced. With two vehicles, probably one of them could be kept in such condition as to be always ready to go. In most cities and the larger towns, where many motor vehicles are used, there are places where they are kept to let to responsible persons. If residing in such a place, arrangements might be made to hire a substitute for one's own carriage when out of commission.

In a year and one half's use there have been but three days when my carriages have been out of commission for repairs and six days when they have been out of use for permanent improvements, and four months of this time I had not a horse to use. My first year's experience was one of very few annoyances and few repairs. Whether I shall ever have another like it remains to be seen. No man can tell, but I hope to do nearly as well. While there may be frequent small expenditures in connection with the use of horseless vehicles, they seem to me more than offset by those attendant on a stable of horses and carriages.

PLEASURES.

One of the principal things that appeals to others as it appeals to me, is the enjoyment of running a self propelled carriage. There is not only a pleasurable sensation of gliding along in a smoothlv running carriage, but to me there is an exhilaration that I have never experienced from any other means of locomotion. The nearest approach to it has been riding on horseback, but the two sensations are so unlike that they are hardly to be compared.

ANNOYANCES

are inseparable from the use of motor vehicles, and they vary very much according to the kind of motor used. The chief annoyances in the gasoline carriages seem to be faulty ignition, which in spite of all that is written on the subject does not seem to be much improved; faulty mixture of gasoline and air; inaccessibility of parts; and, owing to the weight of gasoline carriages, consequent tire troubles.

The chief annoyances in the steam carriage are disturbances of the fire, such as blowing out when standing and burning unevenly when running in the wind, and what is commonly spoken of as "burning back" or "back firing"; deficient air pressure (if air pressure is used and not the system of pumping gasoline direct to the burner); frequent replenishing of water (most steam carriages now carry gasoline enough for from 100 to 200 or more miles); and last, but not least, the ten to twenty minutes' time taken to get up steam. All of the latter annoyances are readily overcome, however; the fire is as easily relighted with a match as a cigar would be; "back firing" and uneven burning are easily controlled by a strong air pressure, and this same air pressure is without difficulty maintained if the carriage is equipped with a steam air pump; the water is quickly and easily replenished in from two to five minutes at any trough, pond or brook, by the steam siphon attached to the carriage, and even the annoyance of getting up steam can be reduced to a minimum by several of the many appliances devised for that purpose, so that one can be sure of steam in from four to fifteen minutes.

The electric has very few annoyances of its own, the chief drawback to its use being the limited number of miles it can be run without recharging, the length of time taken to recharge and the slow speed compared to the higher powered gasoline or steam vehicles. If it were not for these disadvantages the electric carriage would

be ideal. Its advantages are absolute absence of noise, freedom from breakdowns, ease and safety of operation and its original smaller cost.

THE KIND TO BUY.

I should as much think of choosing for a man a wife, a nurse or a horse as a motor vehicle. Every man must choose for himself. To me personally steam is the most interesting motive power. To another man gasoline may appeal. To another man with a compact practice in a district where good roads abound, who does not have to go long distances into the country or who has no taste or time for touring, the electric vehicle will seem the best. So it seems to me that every man must be left to work out his own salvation as far as the kind of motive power he will have goes.

I do feel competent, however, to give some advice to the person about to purchase, and that advice is as follows: Not to buy any of the experimental machines. Avoid them as he would the plague. Buy only the well established and well tried makes, and even some of these are to be avoided.

Not to buy any of the machines that are made in a small way or by small or irresponsible dealers. A friend of mine became very enthusiastic because a friend of his had had splendid success with a certain carriage. That friend told him that a firm of young men was building a carriage almost identically like his, but with some improvements and for $200 less. Of course, he took his friend's advice. I say "of course" because the man had had no experience and did not know any better. Well, he purchased his carriage and started for home. I do not know what happened, but something broke and he and his wife took the train after storing the carriage in a nearby barn. I do not think that man has ever had a comfortable ride or one without all sorts of troubles. In fact, he is in trouble all the time. As a result, he is disgusted, pretty nearly, with the whole business. He cannot get an offer for his carriage and still has it, but he has lost faith in the motor carriage and thinks them all alike. And the ridiculous part of it is, that he cannot, or will not see that he made a mistake in buying an untried vehicle.

Finally, I should advise him when he has decided upon his motive power, to see as many of the carriages in operation as possible and interview the people who have owned them and operated them themselves. He will get a great variety of information, but perhaps from it all he may be able to decide what *not* to buy.

Unless it is a matter of necessity I should advise him not to buy a second hand carriage. While there are no doubt many very good "bargains" on the market, one never can tell what fool things may have been done to them nor in what bad condition the parts that are out of sight may be.

Another piece of advice I should like to give an intending purchaser is to buy only a very strongly constructed carriage of medium weight, not so light as to be torn to pieces by the ordinary roughnesses of the road or its own vibration, and not so heavy as to be unwieldy from its weight or size. It seems to me that the heavy, high powered touring car is illy adapted to the use of the ordinary physician. Life is too short to wait for perfection; I believe in taking the best one can get and enjoy it as much as possible.

A Year's Use of a Steam Carriage.

BY CHAS. A. DENNETT, M. D.

In the closing days of September, 1901, tired of enduring for 15 years the many inconveniences of a horse, I purchased a steam carriage of the latest model which has proved a fine specimen of its kind. A physician gives a carriage the severest test, and it must possess the following requisites if it is to supplant the horse.

First—The cost mile per mile must be no more than a horse drawn vehicle.

Second—It must, barring unusual accidents, take you safely to your destination and return.

Third—The time required to get it ready for the road in the morning must be no more than the time required for a horse.

Fourth—It must be capable of holding steam for at least an hour at a patient's house, and then be ready to start on the instant.

Fifth—It must be so simple in mechanism that the average physician can master its details.

Sixth—It must be easy to manipulate without nervous strain.

Seventh—It must go over all kinds of roads at all seasons.

Eighth—It must be as comfortable and capable of as great speed as a horse drawn vehicle.

Ninth—The first cost must be no more than the cost of a first class horse and carriage and the deterioration no more.

If any carriage possesses all the above requisites, it is sure in a very short time to be in use by physicians. I wish to tell what conditions are fulfilled by my carriage and what are not.

TRAVELED 8,000 MILES.

During the past year I have traveled with my automobile more than 8,000 miles, partly measured, partly estimated. It would take four good horses to do a similar amount of work. The entire cost, estimated, of fuel, repairs and labor has been a little more than the cost of one horse. Therefore, mile per mile it has been much cheaper.

It has been sure to go and return. I have never been towed home, neither have I been delayed longer than one hour, and that only two or three times. I feel nearly as certain of accomplishing my journey as I do with a horse.

TIME NEEDED TO MAKE READY.

It takes from one hour to one hour and a half to get the automobile ready for the day's work. This is for a carriage used day in and day out, as I use mine. Most of the work can be done the night before, that is, the carriage can be washed, fuel and water tanks filled, machinery cleaned, etc.; then in the morning it will take fifteen to twenty minutes to steam up. Of course there are days when more work has to be done. I think it takes nearly as much time to care for my machine as it does for a horse and carriage. But it has one great advantage—it can be made ready in the morning for an all day's run, and when not in use requires no attention. I think this is a conservative estimate of the time required, notwithstanding manufacturers will tell you it takes only fifteen to twenty minutes a day. It consumes that amount of time to wash a carriage.

Under ordinary conditions I can leave my carriage out of doors one hour and have steam ready to start at once. I have left it for three hours and had steam, but this is unusual. In the garage it will easily keep steam for three hours or longer. Sometimes when the fire goes out, but this is not often, all the steam is lost in half an hour.

NOT A MECHANIC.

I think the average physician could successfully manage my carriage after he had used it a few months, although at first there are many annoying incidents. But it is easy to locate the trouble on a steam machine and tell whether you can repair it yourself or not. I am not a mechanic in any sense of the word, but I do enjoy the beautiful mechanism of my carriage. My chief troubles have been with tires, water glasses and the fires. The engine has given very little trouble, and I know now how to attend to the fire and water glasses. If any physician expects an automobile to care for itself, he makes a great mistake. It requires constant attention when in use, just as a horse or any machine does.

It requires less energy on my part to ride 50 miles with my automobile than to drive a horse half that distance. It is much easier to manage, easier to select the road and the machine goes where it is pointed.

OUT OF SERVICE IN COLD WEATHER.

I have never yet found a piece of road or a hill I could not go over, except where there is considerable snow, and I have ridden at least 1,000 miles over the poor roads of that "summer paradise of all this world," the State of Maine. I cannot use my carriage when the temperature is below 30° Fahr., so it is of but little use during December, January, February and part of March, although I have used it some part of every month of the year. The freezing affects only a few pipes; if these were protected the carriage could be used in quite severe weather, but it should not be left standing for more than an hour or perhaps less time. There are very few days in this

STANLEY STEAM.

PACKARD GASOLINE.

LOCOMOBILE STEAM.

OLDSMOBILE GASOLINE.

PACKARD GASOLINE.

DE DION-BOUTON GASOLINE.

DOCTORS IN BOSTON AND VICINITY USING AUTOMOBILES IN THEIR PRACTICE.

locality when snow prevents the use of an automobile. One of my friends used his gasoline machine every day save two last winter.

My automobile is not so comfortable to ride in over rough roads as my pneumatic Stanhope, but I have ridden 146 miles with the auto in less than twelve hours and call it quite comfortable. When a little more attention is given to the carriage part it will be much easier than a horse drawn carriage. As for speed, I can go as fast as I dare to ride, but 15 miles an hour is an enjoyable speed.

My machine cost $650, which is about what the cost would be to equip in first class manner a horse and carriage, but my automobile will do the work of four horses. With regard to deterioration in value, my automobile is running as smoothly today as when I bought it, and I think the machinery will last several years. The carriage part is in good repair.

I believe a good steam carriage can be built and sold for $600 to $700, with good profit to the manufacturer, for the following reasons: A first class carriage, well upholstered, with rubber tires and fine leather top, will retail for $300; steam boiler, $50; engine as good as the Mason is listed for $90, and can be bought for less; tanks, pipes, automatics, gauges and pumps, $50, allowing the balance for labor and incidentals. Most of the steam carriages on the market are very poor. There are only three or four that I should like to own; most of them I would not take as a gift, if I had to run them a year.

To my mind, the pleasure of automobiling cannot be overestimated, and after using an automobile for more than a year I dislike much to drive a horse. I shall rejoice when I can dispense with horses and have an automobile that can be used at all seasons. To leave home on a beautiful summer day, spin 30 or 40 miles to some "tavern in the town," then after dinner go leisurely home over some fine State road is an experience that makes one feel like a king.

STEAM VERSUS GASOLINE.

I am a steam man, for I began my experience with a gas engine. I know how very sensitive they are and how difficult it is to locate the trouble when things go wrong. The noise made by many of the gas machines is deafening, while my steam machine is practically noiseless.

The automobile is bound to displace the horse in most sections of the country, and within twenty-five years our park commissioners, who now exclude motor vehicles from their domains, will be prohibiting horses from those same parks for hygienic reasons. Education will do it.

A Gasoline Runabout in a Massachusetts Doctor's Practice.

By Dr. M——.

I reside 20 miles from Boston, where the roads on the whole are in fair condition. We have a good many grades, a good many loose stones and altogether too deep a layer of gravel, when the roads are repaired, but on the whole I presume they will average with Eastern Massachusetts roads.

On July 30, 1902, I purchased, on the advice of a gentleman who was in his seventh year's experience with automobiles, a 3½ horse power motorette. The dealers of whom I purchased sent a competent man to run the machine home with me and to explain its use and care to the man who would take care of it and to myself. On the way out I observed to the demonstrator that if the machine had a longer wheel base and little larger wheels it would be a great improvement, particularly on rough roads. His reply impressed me as being very sensible; he said: "That is true, but you must remember if you had a longer wheel base and larger wheels it would necessitate having a stronger frame, which would add weight to the carriage and necessitate the use of a larger engine, all of which would add materially to the cost; this machine is a runabout, and if you are looking for a touring car you must get something different."

I am a physician, and as the town in which I reside is small I am obliged to go into the outlying districts on all sides; in fact, my field is practically a circle with a radius of 5 miles. I have run the machine so far a little over 3,500 miles. Have been hung up on the road five times with it, but only during the first two weeks. The first cause of trouble was a broken trembler. Not having a duplicate, I was obliged to draw it home. The next three times were from water in the carburetor, and the last time was probably from faulty mixture, due to ignorance on my part regarding the adjustment. I abandoned the machine 5 miles from home and got a farmer to take it home, and another one to take me on the trip I had started out to make. You can imagine my disgust on arriving home to find that my man had started it without any difficulty whatever, and was exercising it up and down the street before the sidewalk committee who had assembled to see what accident had incapacitated it.

I enclose you the expense list which I have kept in connection with this machine. You will see that I have purchased a good many spark plugs, but so far I have had only two decent ones out of the lot. Then a rubber hat, boot and poncho, all are charged against the machine as things I should not have gotten except for the machine. I attribute the good showing I have made in a large measure to the excellent care the machine has received. The man who cares for it is very much interested in it and looks it over carefully every time it comes into the stable. He is very particular to see that it has plenty of oil, and has a routine every morning. He cleans his inlet valve, cleans his spark plug, adjusts his trembler, and tests his spark, and thus far I have never heard the engine miss, and it almost invariably starts with one turn of the crank. I also take a little credit for careful running; on bad roads I only run it from 10 to 12 miles an hour, and on good roads only from 15 to 17 miles. Five miles in 16½ minutes is my record. I am very particular about throwing the clutches in, as the fact that the high speed clutch has only been tightened three times in 3,500 miles will demonstrate.

In muddy weather I have found the machine almost entirely free from any tendency to skid, so much so that I never think anything about it. In running a friend's touring car the other day after a rain I came very near colliding with a tree, and several times became very much frightened at its erratic course. You will see in my list of expenses that I broke a ball cup on one rear driver. This was not the fault of the machine. Without going into details I will say that it happened on a rough road when I was driving with a heavy passenger for every bit of speed I could get out of the machine.

I have found the manufacturers most delightful to deal with. I have written a good many letters of inquiry and have always received the utmost courtesy from them. I happen to have two or three friends that are expert machinists in other lines of work, and they inform me that my machine is well made and so far as they can see built from first class stock.

The following is my expense list:

July 30	—One extra inner tube	$4.87
"	One spark plug	2.00
"	Gasoline	.36
"	Car fares for demonstrator	.36
Aug. 1	—One extra inlet valve	3.00
"	Five gallons cylinder oil	3.75
"	Five pounds of grease	.75
Aug. 3	—Gasoline	.36
Aug. 4	—One bolt	.05
Aug. 5	—Gasoline	.36
Aug. 8	—One trembler	1.25
Aug. 9	—Telephone	.60
"	Time and car fare for a man to come out and show us how to get water out of the carburetor	2.74
Aug. 13	—One trembler	1.25
"	Gasoline	11.85
"	Rubber hat	1.00
"	Poncho	1.50
Aug. 25	—Patching rubber for inner tube	.25
Sept. 5	—Work on rubber boot	5.50
Sept. 11	—Lock nut	.15
"	Carburetor, sieve, spring	.35
"	Local mechanic	1.00
Sept. 16	—Car fares and price of nut	.75
Sept. 18	—Spark plug	1.75
Sept. 19	—Piece of enamel cloth for use over gear in rainy and muddy weather	.55
"	Express on reverse chain	.25
Sept. 23	—Spark plug	2.00
"	Roll of canvas	.10
Sept. 24	—Local mechanic	.60
Sept. 25	—One new exhaust pipe	1.25
Oct. 19	—Two spark plugs	4.00
"	Fares, telephone, etc	.75
Oct. 31	—Telegram to Buffalo for ball cup	.64
Nov. 1	—Ball cup	1.00
Nov. 7	—Gasoline	13.12

As assets I have two good spark plugs and several that are of no value; an inner tube that is practically new; an extra inlet valve; an extra trembler; also considerable oil and gasoline on hand. Aside from the deterioration on the carriage, which does

not look to be very great, I should not like to cover 3,500 miles with a horse with no greater expenditure. From my personal experience I do not ask for anything better for a runabout than this machine.

Auto Pioneering in Connecticut.

By Dr. A. N. Clark.

In October, 1899, I sold my horse and purchased a heavy gasoline motor carriage. During the first winter I ran the machine every day, except two or three days when it was waiting for a new tire.

My machine was the first in my neighborhood, if not in the whole county, and I experienced so much trouble with horses that after the first winter and until this past summer I only used the machine in stormy weather and for occasional pleasure rides, making most of my calls in pleasant weather on my bicycle. During the last year automobiles have become so common a sight in this section that very few horses pay any attention to them.

During the past three years I have run the machine over all kinds of roads, and in all kinds of weather; but last February we had a heavy snow storm, which came when the roads were deep with mud. The snow was wet and heavy, the weather mild, just above freezing, and for two weeks I was obliged to hire a horse.

BUYS A LIGHT MACHINE.

Last July I purchased a lighter machine, second hand, in good condition. I used this constantly for over three months, when I sold it. I found it a very convenient little runabout, but not what I wanted for rough work. It was also very difficult to keep in running order.

A WORD FOR THE OLD TIMER.

I am still running the old machine, and it runs stronger and better than ever, for I have added a shifting spark device and an air valve that can be regulated from the seat, as in later models.

Although this old machine is clumsy and noisy, and wastes a lot of oil, it is reliable, and I can keep it running in any kind of weather, hot or cold, wet or dry. It almost always starts with one or two turns of the crank, and if it only had more power it would go almost anywhere.

TOWED HOME ONCE.

During the three years and over that I have owned this machine I have never failed to reach home by its own power but once.

This happened one winter afternoon. I was about five miles from home and the roads were frozen hard and very rough. I had only one set of batteries at the time, those that came with the carriage (Edison wet cell). The engine had been acting badly for some distance and finally stopped. I got out, adjusted the sparking points, started, went about fifty yards and stopped again. This was repeated several times, and I concluded that the best place to fix that battery was at home. A man with a horse came along and I was towed home.

Examination of the battery showed that the zinc plates in two cells had been broken off by the vibration on the rough road. It is a wonder to me how I got any current from the other cells with two plates gone. Now I always carry two sets of batteries and always try to keep them both in first class working order.

DELAYS ON THE ROAD.

During the three years I have been delayed on the road by the following causes:

1. Sparking points out of adjustment.
2. Chain cut water pipe.
3. Mica packing blew out of spark plug.
4. Hot eccentric.
5. Set screw in differential fell out.
6. Release valve stem fell out, nut and washer lost.
7. Broken chain (twice).
8. Stripped a gear.
9. Tire troubles.

Of these causes the sparking points have given me the most trouble, but I soon learned to keep them adjusted and to fix them as soon as they showed signs of giving trouble. The large silver points that I now use are much more satisfactory than the small platinum points used at first. In the past two years I have had no real trouble from this cause.

NUTS AND BOLTS.

When I first used my machine every nut and bolt had to be watched and gone over once or twice a week with a wrench to keep them tight. I soon fixed this with square copper washers placed under each nut or bolt head, one end bent down over some convenient corner and the other end bent up against the side of the nut. This took time, but it saved more in the end.

After I had had the machine about two weeks I took a ride to New Haven, thirty-five miles distant.

The chain had become a little slack and rested on the rubber pipe which connected the water tank with the engine jacket. I supposed that was all right, as the makers had taken no pains to protect the pipe.

PIPE CUT INTO.

When I reached New Haven I found the pipe cut into, and the water running out about as fast as I could pour it into the tank. I tried to plug the hole with a tire plug, but it would not hold. I finally sharpened a stick, drove it into the hole so the point rested on the opposite wall of the tube, cut it off even with the outside, bound it with tire tape, tightened my chain, filled the tank and came home without losing a cupful of water. A few days later I put in a new pipe with a 2 inch iron pipe coupling covered with rubber slipped over the pipe to protect it from the chain.

SPARK PLUG PACKING.

When the packing blew out of the sparking plug I removed the plug in the presence of a large and highly interested audience, it being Sunday afternoon and on one of our main streets. The machine was then nearly new and a great curiosity in itself.

I took the plug to the shop of a friend, cut out new mica washers, put it in a vise, tightened the nuts up as they should have been tightened in the first place, and it has never given me any trouble since, although I carry an extra plug.

THE HOT ECCENTRIC

was caused by the oil cup upon it having a round cover tightened with the fingers. This came unscrewed, the oil was thrown out of the cup and the eccentric became hot, causing half an hour's delay.

I filed the cap eight sided, tightened it with a wrench, and it has never come loose since.

The thing that used to give me more trouble than all the rest of my carriage was a

SET SCREW IN THE DIFFERENTIAL.

It was screwed into one of the gears in the meanest kind of a place to get at, and at the level of the surface of the gear had a square shoulder against which the metal of the gear is supposed to be battered down with a cold chisel to keep the set screw in place. Mine kept coming out. Twice it came out on the road and let the rear wheel on that side run out nearly to the end of the axle. This happened once coming down hill, the brake would not hold as the differential was not working; fortunately the hill was short and straight and what might have been a bad accident was avoided.

After that I watched that set screw constantly; had to tighten it every other time I went out (and it was a dirty job, as the gear case had to be removed). I finally fixed it with a piece of spring brass wire, one end of which I worked down around the shaft of the gear and fastened there, and the other end of which I bent into a square loop and bent over so as to spring it down over the square head of the set screw. The wire turns with the gear, and the set screw stays in place and has required no attention in over a year.

RELEASE VALVE STEM.

One Sunday afternoon the nut and washer were lost off the release valve, which is a small brass pet cock; the valve stem blew out, and the engine stopped for want of compression.

The valve was in a very inaccessible place, and I tried to get home by forcing a round stick through the hole for the valve stem.

This burned out in a couple of hundred yards, and I had to get down on a lap robe in the dust under the carriage, put the valve stem in place and tie it there. Now I carry an extra valve.

CHAIN MISHAPS.

Twice I have broken a chain; both times when going down hill. The first time it was caused by putting on the hand brake very suddenly. What caused it the other time I never knew unless the chain was a little too loose and rode the sprocket. I know that it broke, and I had to fix it, right there in the mud on a hot, muggy day. I can sympathize with Robin Damon, as it is the same kind of a chain as his, but I did not get down or under the carriage. I used a wire hook to draw the end

of the chain up where I could get at it, and fixed it all alone in half an hour.

THE STRIPPED GEAR

was my own fault. After nearly three years' use of the carriage I, one day, while the engine was racing and the carriage standing still, threw in the high speed clutch with a jerk, and ripped six teeth off a gear quicker than a wink. I knew better, but was running fast, stopped a second for a friend, and in my hurry pulled the clutch too quick.

I got home all right, but had to wait over a month for a new gear, and had to take the whole machine apart to put it on the main shaft.

TIRE TROUBLES.

Of tire troubles I have had my share, but have always reached home, sometimes with a flat tire.

These are all the delays I have had with the old carriage, except when a clutch needed tightening or some nut had to be tightened to stop a rattle.

WITH THE LIGHT MACHINE

I was delayed several times by the mixture, the diaphragm pump failing to work or the crank case leaking air. Once the cylinder head packing blew out and I had to go home, get the old machine and tow the little one home.

Still I found it a very convenient little runabout, and the makers would have a good machine if they would only do away with the air tight crank case and diaphragm pump, put in a gravity feed mixer or carburetor and change the cylinder so there would be no chance for water to leak in from the water jacket.

This last is the worst fault of this machine. Out of five machines of the same make in town the past summer, every one had to have from one to six new cylinder packings within three months. A wider flange of metal to hold the packing would probably remedy the fault.

SUGGESTIONS.

A box dash in which one could carry a few small articles instead of the curved dash used at present would still further improve the carriage for a physician's use. It is quiet running, inexpensive to operate, and requires very little attention when in good working order. A few changes would make it a fine carriage for most of a physician's work, and a little longer wheel base, a couple of hundred pounds more weight and another cylinder would make it suitable for almost any kind of work that a physician's automobile would be put to.

BATTERIES.

I have used Edison batteries, Nungesser wet batteries, dry batteries, and am now using two small three cell storage batteries, which give a fine spark, and if they could be made to stand up under the rough use which an automobile gives them, would be the best and cheapest form of battery. One of mine gave me no trouble in several months, the other had two broken connections during that time. Either wet or dry batteries cost about as much per year as the gasoline used. In fact, the first year I owned a carriage my gasoline cost me $33; oil, $21, and batteries, $48. I estimated my mileage for the year at a little over 6,000. At that rate batteries cost me nearly four-fifths of a cent a mile. One half cent a mile would be nearly the actual cost of batteries.

COST.

The greatest item to a country physician in the cost of using an automobile is the depreciation in the value of the carriage from one year to another. I bought my carriage three years ago for $1,000. If I should sell it today I could not get over $200 or $300 for it, although it is a better running carriage than when I bought it. I figure the cost of keeping a horse at about $300 a year, so I could almost have kept a horse during the three years for the amount my carriage has depreciated in value. What I have spent on the carriage during that time has been an extra expense, against which I can charge,

First, the fun I have had from the auto (also the trouble).

Second, the saving of time, for it gives me more time to myself. Work that would take all the morning and part of the afternoon with a horse can be done in a morning with the auto.

Third, the greater comfort in driving in wet weather, for with a good top and storm apron and curtain across the front of the top you are dry and comfortable in the worst storms, with no wet lines to handle or horse to hitch and unhitch, with a wet tie line.

HOW TO AVOID DEPRECIATION.

The only way to avoid the great depreciation in value is to buy a good second hand carriage cheap. I bought my light machine in good condition at a bargain, used it over three months, and sold it for about what it cost me. In the heavy machine the cost of tires is the greatest item; in the light machine this item will be less than one-quarter as heavy. The large machine also uses more gasoline than the small. My large machine uses about 1 gallon to every 15 miles; the other used a gallon every 25 miles, as near as I could make out.

REPAIRS.

I have done all my own repair work during the three years, having had help from a friend (not a mechanic) when doing work that required help. Of course there have been one or two small blacksmith's jobs, such as a broken spring and a broken chain adjustment screw, but outside of these I have done all repair work, and if there is any part of my carriage I don't understand I don't know what it is. Twice a year we give the carriage a thorough overhauling, take up all wear and put everything in first class shape, as far as possible. If anything goes wrong meantime I try to fix it at once.

REPAIRS BY NIGHT.

Most of my repair work has been done after 10 o'clock at night, as during the day it is impossible to get down to such work owing to interruptions. With the aid of an electric light I manage to get along about as well as with daylight, and have done work on that old carriage that would have cost several hundred dollars if one had to pay for the time put in.

While I cannot say that I enjoy this work, I do not dislike it, and the better a man knows his carriage the less trouble he will have with it, and the sooner he can fix it on the road.

Many parts can be made at a machine shop cheaper than they can be bought from the manufacturers. I suppose the reason for this is that the makers put a big price on their carriage, and in order to prevent people from buying the parts and putting the carriage together themselves, they have to charge double price for the parts.

TIRES.

For a heavy automobile the clincher tire is the only thing.

In a single tube tire it is almost impossible to make a plug hold any length of time against the great air pressure required, and a punctured tire means a tire to be taken off and sent to the factory to be vulcanized.

With a clincher tire one can carry an extra inner tube and put it in on the road if it becomes necessary. This is not easy, but it can be done. With a light carriage a good single tube tire is fairly reliable, but I think I should prefer the clincher.

In winter on rough frozen dirt roads the heavy carriage will often tear the rubber of the tire right off the canvas for several inches. A light carriage would not be nearly as apt to do this.

WHEELS.

Wheels should be of wood, simply because they are more easily washed.

Wire wheels can be made strong enough, but they are a nuisance when the carriage is washed.

COLD WEATHER.

It is much more difficult to run an automobile successfully in cold weather than in warm.

In starting on a cold morning the cylinder oil will be thick as vaseline, and it is not until the machine has been run a couple of miles that it gets warmed up enough to develop anything like its full power.

Seventy-six degree gasoline works much better in winter than the ordinary stove gasoline.

To avoid freezing of the water when standing in the barn I place a lighted lamp under the carriage, having first made sure that the gasoline is shut off. My water tank is all enclosed within the body of the carriage, and by covering the rear end of the carriage with a rubber cloth and the carriage robe, enough heat is retained to prevent freezing in the coldest weather. When the carriage is running the engine warms the water, and when making long

calls in cold weather I throw the carriage robe over the wire gauze in the rear end of the carriage. One winter I used calcium chloride, 5 pounds to the gallon, but even then I used the lamp in the coldest weather to keep the oil a little warm.

CALCIUM CHLORIDE

does not affect the copper tank nor the engine jacket, but it does seem to eat solder, for by spring my water tank, which is of copper with a number of tubes running through it for air circulation, was leaking in many places where the tubes were soldered in, and in the spring the tank had to be taken out and resoldered.

This winter I am not using anything but the lamp.

With water coils in front calcium chloride or glycerine would be a necessity in cold weather.

SNOW.

When the ground is frozen, a few inches of snow, unless very wet and slippery, do not bother my machine. Deep mud with a few inches of snow on top, is a combination that taxes a machine to the utmost. I was much interested in Harry B. Haines' article in the December 17 issue of The Horseless Age, in which he gives his experience with a light weight machine in the snow. The heavy machine evidently gets much better traction, and is less liable to slip than the light one. Mr. Haines says that a rope wound around the tires on his machine will last about a week. On my machine an ordinary clothes line will not last much over 5 miles.

TO PREVENT SLIPPING.

In winter I carry with me four small hitching chains, with snap hook on the end of each. Two of these on each rear wheel will prevent slipping under any ordinary circumstances, but if used much will cut into the rubber of the tire, and will take the paint off the rims.

I seldom have use for them, but might need them for a bad hill. So far this winter I have not used them, as the heavy machine does not slip except on very wet or very heavy snow.

I have ploughed through light snow that was up to the tops of the front fenders, but with heavy packed snow, a drift that is hard enough to lift the rear wheels a few inches from the ground will cause them to slip, and in such a case it is difficult to get traction.

As soon as the snow gets packed, so that the sleighing is good, there is no trouble running the machine.

This winter, from December 5 to the 13th, our roads were covered with a coating of light snow and ice. I used the machine every day, climbing all grades without a slip. On the 13th we had snow all day, and the wheels slipped a trifle on one hill, which had about 4 inches of snow over the ice. On the 14th and 15th I could have used the chains, as we had about 8 or 10 inches of heavy mealy snow over the ice of the previous storms. Those two days I hired a horse rather than overtax my machine.

POWER.

Of all the faults a machine can have the worst, in my opinion, is lack of power to overcome any possible condition of road that a man may have to travel over.

The giving of first class certificates in the recent endurance test to machines that had to be pushed up an ordinary hill, in good weather, seems to me far from right. Such machines are not practical, and certainly should not receive first class certificates.

Of all the gasoline machines on the market today there are only two or three that have sufficient power for a physician's use in all seasons, and even these would be better with a little more power.

I am not speaking now of the touring cars, which are most all too fast and too expensive to be practical.

THE AUTHOR'S SPECIFICATIONS.

A machine should not weigh over 150 pounds to the horse power, and 100 pounds would be much better in my opinion.

With this proportion of weight and power, and geared to run from 15 to 25 miles per hour, with a good reduction for the slow speed, one could go over any road where the wheels would hold. I am now having built a machine after my own designs. It will have two cylinders, opposed, horizontal, each 5½x6½. These should give me from 15 to 18 horse power, perhaps more when speeded up, but I should be certain of 10 or 12 horse power, even when the engine is not working its best.

The machine is to have a 6 foot 6 inch wheel base, standard tread, wood wheels, 32x3 inch clincher tires, brakes on both hubs and on differential.

It is to have a large water tank in the body and water coils in front. These are so arranged that the coils and pump can be shut off and drained in cold weather, and only the rear tank used, but by turning a valve the coils can be used if desired.

The machine is figured to weigh in the neighborhood of 1,400 pounds, is geared nearly 4 to 1, and should run about 15 miles an hour at 600 revolutions.

With this power and weight I figure it should be able to take most of our hills, in ordinary weather, on the high speed, and only use the low gear when they are deep with mud or snow.

Either cylinder should be able to run the carriage alone in good weather, and I expect to arrange matters so that the gasoline can be cut off from either cylinder at will if desired.

EXTRA REAR WHEELS FOR SNOW.

I am thinking of having an extra pair of rear wheels made for use in deep snow. If I do they will have steel tires, with clips bolted on every six or eight inches, after the idea of Jules Junker.

I do not see why such wheels would not take hold in most any snow, and with the high power and the weight of the carriage so distributed as to bring most of it on the rear wheels I believe they would work all right.

In deep snow one would not need pneumatic tires, and in light snow one would not need such wheels. If the automobile is to take the place of the horse it must go through snow, and it is only by some such an arrangement that it can do it. At any rate, I think I will try the experiment.

ADVICE TO A BEGINNER.

My advice to a beginner would be: Buy a machine with plenty of power for its weight.

An air cooled motor would be an advantage in winter.

In building a barn make it large enough to hold two machines and allow you 3 or 4 feet on every side of them.

If I were to build another barn it would have a main room at least 16x20 feet, with cement floor; on one side a pit to stand in when working under the machines; on the other side, the floor slanted to a drain in the centre, so the carriage could be washed right on the floor as soon as run in. A small addition or an extra room outside with a small hot water or steam heater and pipes running around three sides of the main room to keep the room warm in winter would be worth all it would cost. These two rooms should have no communication with each other, so there could be no danger of fire when filling the gasoline tanks.

This extra room should contain a bench with vise and other tools. Or an upper floor could be added with workshop, closets and room for a man.

Have electric lights and running water, if possible.

Learn to know your machine thoroughly.

CONCLUSIONS.

A man with one machine may be able to keep it on the road every day, but he will have to sit up nights (at times) to do it. A busy physician should have two machines, and someone to look after them. Then one at least will always be ready.

One machine and a horse will do more work than three horses. The machine will save a great deal of time, on long trips especially, and except for the item of depreciation in value will be a saving in expense. For the present physicians in hilly localities will find horses more reliable in winter than gasoline machines.

I have no wish to go back to the use of a horse, although my present machine is far from what it should be.

Steam Power and a Light Carriage Advocated for Physician's Use.

By Dr. Henry A. Baker.

Steam has proved to be too reliable a servant as motive power to be abandoned. In my opinion, it would be very difficult

to get a better substitute for propelling automobiles. There is nothing to be compared to it in elasticity of speed varied instantly from that slower than a walk to 30 miles an hour. I have favored it ever since automobiles came into vogue, and the more I see of other powers the more decided I am in its favor.

We well know the first carriage of this type was crude and unsatisfactory and caused much trouble. No doubt it prejudiced many. As a result, they adopted other power, but with the many improvements that have been made, it seems almost impossible to get anything more reliable than the up to date steam carriage. Without a question there will be further improvements from time to time. While there are various kinds of boilers, as long as gasoline is used for fuel, probably there is none that will make steam as rapidly, economically and hold a reserve as well as a properly constructed fire tube. Such a boiler, made without a bolt, rivet or screw, and showing no sign of weakness up to 1,400 pounds steam pressure, appears to me as being pretty reliable for a motor carriage. With a steam superheater and downward draft, which was thought at first impossible, you get a still greater economy. With the ball bearing engine, with forced cylinder lubrication, chainless drive and automatic fuel feed, which does away with the main tank pressure, with the present seat fuel control, and with some other late improvements, the steam machine seems to me almost perfect.

I have owned three carriages, all steam, and when I began to get the fever I studied the subject in good earnest. As it has been said of me, among my friends, that I am of mechanical turn of mind, I found automobiles much more simple than I at first supposed. After feeling that I understood the construction and working of the machinery I purchased a second hand carriage in order to test whether or not I should like it, with the result that realization far exceeded my anticipation in the way of pleasure and utility. So I changed carriages, from time to time, as improvements were added.

My last carriage, which I bought new last April, has proved one continual source of pleasure and satisfaction, for over 5,000 miles. My advice to all prospective purchasers has been to buy a second hand carriage, and get familiar with all its working parts before buying a new one. By so doing they avoid many breakdowns and injury to the new, which is liable to occur to one who is not familiar with them, and thus are better judges of what kind of a carriage will meet their requirements.

I learned long ago that it was not wise to listen to the flowery tongues of the agents. They invariably have the only carriage which is good for anything on the market. We often hear them say, in reference to a gasoline carriage: "You will have no trouble with our carriage, and nothing to watch but the road." And I think they must be right, as I often see them watching it from the side with wistful eyes as I pass by. Or it may be, as their machines never give them any trouble, possibly they are looking for it.

"I counted two and seventy stenches
All well defined and several stinks."

DESIGN.

As I have seen little or no discussion upon the design of automobiles in these columns, I would like to say a few words upon it. Without question, the design of a carriage has a great influence upon its sale, either for or against it. The first thing a prospective purchaser will consider is its design. If it pleases him he is at once interested. On the other hand, if it does not, he is very apt to abandon investigation. The pioneers adopted the line of the horse drawn vehicle; as a result we were so accustomed to the style that little or no comment was made. And to my mind, the first steam runabouts were as pleasing to the eye as have ever been designed, but they soon proved unsatisfactory for fast running, on account of the short wheel base.

It was at this time that the freaks began to appear, and in no other line have we seen so many as in automobiles. Often new designs seem pleasing at first, but we soon tire of them, not unlike our house building. Not so many years ago everything was built on the French roof plan. How do they look at the present time? Still longer ago, the old colonial style prevailed. The latter has stood the test of time, and today looks better than ever. It is possible that some of our carriages of today may stand the test while others will always remain freaks. There is one thing sure, a long wheel base is desirable.

ADVOCATES A LIGHT CARRIAGE.

I believe that to get strength weight in carriages has been carried to the extreme. Weight does not always mean strength, or prevent breakdowns. From my point of view, for all round work, a light elastic carriage will outwear the heavier. There is nothing stronger than its weakest part. We all know the greatest strain on the automobile is on the running gear, especially the axles, and in my opinion, if properly constructed, with well balanced strength, they can be made strong and yet comparatively light. I know of no stronger construction than the so called car truss principle for axles. I think that the rule is a light carriage for city use and a heavy one for country roads. My views are right the opposite. I was brought up in the country, and for hilly country roads I have always found the horse drawn carriages either for public or private use are of the lightest type, barring speeding buggies. I wager, if you go among the farmers, who travel over some of the roughest and hilly roads, you will find for family use light carriages and generally of the cheapest make, and they stand the test, too. Two such carriages generally last the farmer his lifetime. There is no question that tire troubles are greatly reduced in the light automobile. I judge from contributions to these columns that tire expense is no small item. While the heavy carriage takes much more power, is comparatively logy and much harder to control, requiring an expert to keep it in running order, the wear and tear are greater, and will carry no more passengers, the light carriage will do everything the heavier will, and the first cost is very much less; it is much more economical to run, and it will outwear it. What advantage is there in a Pullman car on public streets, or in other words, an ox-cart for pleasure riding?

"Better it is to bow than to break."

CARE OF MACHINERY AND REPAIRS.

As I have stated above, before I purchased I thoroughly acquainted myself with the construction of automobiles, and as I like machinery, I cared for it myself. I learned many years ago that proper adjustment and a plentiful supply of oil mean long life to machinery. If anyone expects that automobiles or, in fact, any kind of machinery, will run smoothly and last, without constant care, he will be very much disappointed. Ceaseless vigilance is my rule. I never take my carriage out of the stable without oiling the running parts, and every few days I inspect it thoroughly and adjust it if need be. I do everything but the washing, and have done that. I have a very large and convenient stable for doing all of these things, in which I used to keep from one to four horses. It is now entirely devoted to the use of automobiles, for my friends and myself, and is never vacant, and I will state right here, if anyone will give me the best horse that stands on four legs, make me a present of it, if I would keep it, I would decline with thanks.

Owing to the fact that my practice is entirely confined to the office, I only ride to and from home, which my odometer registers just 9 miles each way. My running time generally is just thirty minutes, but my average running for the day in the season is 25 to 60 miles. I prefer not to run in rain or snow, or in the coldest of weather, on account of the discomfort.

It is rather amusing to me to see how some men care for their machines, seldom oiling or adjusting them. If their attention is called to it they say: "Haven't time today, but will see to it tomorrow," which never comes; they are as liable to go out with no water or fuel as otherwise, and while running may blow from one to three safety plugs a day, and come in—with the machine squeaking, rattling, etc., and the cylinder oiler may not be working.

A LIGHT REPAIR BILL.

I haven't a doubt that when I state the amount of repairs I have had on my machine some of your readers will put me down as a notorious liar, but nevertheless I shall state the truth, and my advice will be before anyone attempts to criticise to

first make an investigation, and I will stand ready to prove my statements. I have applied some new improvements, while the old devices were working well, and my repairs have not exceeded $10; they were as follows: After I had run about 3,000 miles I heard a click in the engine. On investigation I found a screw gone from the dust cap that covers the ball bearing of the crank shaft. I ran to the factory to procure a new screw, stating that I wished to be fashionable enough to pay something for repairs, and they accepted 1 cent. The following day when running around town, doing some errands, I heard a scraping noise. It was so unusual for me to hear noises about my machine, my first thought was that it had all gone to pieces, like the deacon's one hoss shay. But in going about 100 yards I discovered my trouble to be nothing but a broken mud guard holder, letting the mud guard down on the tire and causing the noise. Tying it up with a string and freeing it from the tire remedied it. Next morning another trip to the factory. I said to the proprietor: "Guess my troubles have begun."

A brake on my machine required repairs, and it was my intention to leave it, go to my office by train and call for it on my return at night. Their reply was: "Those were among the first lot made. As they had made a decided improvement, would replace them all for me without charge." This I was much pleased with, and felt I was not dealing with a lot of sharks. My next repairs were three spokes, which necessitated removing the rear wheel. I paid $1 for having them put in. After running about 1,000 miles farther, one afternoon, in returning from my office with a friend, my steam pressure suddenly went down, also the water in the boiler, and steam came out in great quantities from underneath the carriage through the burner. I immediately put out the fire and jumped out. It seemed to me that the tubes in my boiler were all burned out. I set to work to transfer my auxiliary hand gasoline pump to the water supply, as the carriage was arranged to do, pumped up my boiler about two-thirds full, started my fire, and after getting up steam turned on my by-pass pump and went on my way. While I was losing a good deal of steam with the pump on, I could just hold my water level and steam enough to run at the rate of about 6 miles an hour, but instead of going to my residence I went to the factory. After taking the burner off we found that the nipple receiving the water supply pump was leaking. By unscrewing the supply pipe and taking out the nipple, which is a drop forging, we discovered that in drilling the holes at right angles to meet each other, one of them was drilled nearly through, and in time had worked clear through. This was the result of a little carelessness on the part of the workman who drilled them. After substituting a new nipple and replacing the burner, everything was as perfect as ever. No charge was made, on account of the defective nipple. After returning from my trip of 500 miles through New Hampshire and Vermont, of which I will speak later on, during one day's run over a very sandy road, for about 8 miles the wheels sank into the sand about half way to the hubs. As a result the sand got into the differential, which was not covered, and caused it to wear so that it groaned a little. At the factory I was informed that they were not worn enough to do any harm, but as I was very much averse to noises I had new pinion gears put on at a charge for four hours labor of only $2, after which I was sure that I was not dealing with sharks. Since I have added a new chain—$3—and four new water gauge glasses, which include all of my repairs, except a little tire expense, which has been proportionately small. My off rear tire showed weakness very soon after purchasing the carriage. It did not appear to be punctured, but leaked all over the surface. Putting in a little water stopped it for a while. Then I put in some Never Leak, which stopped it for a while longer. Then I put in West India molasses and water. After this it did good service for almost two months and then gave out. I went to the factory, where they gave me a tire in place of the old one, which a customer had exchanged for a new one. I thought I could mend it with the repair kit, but found I could not, and had it vulcanized at an expense of $1.50. As it appeared to be almost a new tire, it is doing good service, with the exception of one puncture, caused by picking up a tack in one of my front wheels, which I plugged at once.

THE PROPER CARRIAGE FOR THE PHYSICIAN.

It has been quite a query with me as to the best carriage for the physician's use. Last spring a friend of mine, a physician, told me that his horse expense was about $60 per month. I advised him to get an automobile with explosive motive power, as I had been told they were always ready to go out at any moment. So he purchased what we supposed was one of the most reliable gasoline carriages on the market. When I say he has had trouble it mildly expresses it. His repair expense has gone into the hundreds, but just the amount I am unable to state. But I do know this, I have regretted many times that I advised him to get a gasoline carriage. Probably his next carriage will be steam. My advice to him now would be to get a medium weight carriage with long wheel base, with fire tube boiler and steam superheater, chainless drive, force cylinder lubrication and seat fuel control, gasoline tank carrying at least 14 gallons, automatic fuel feed, water level indicator by balance float, combination body carrying two to four persons if necessary, and clincher tires. I would have such a carriage equipped with an auxiliary pressure tank holding about 2 gallons under pressure by hand pump, with no by-pass or valves, except the main control valve. This I would have run the pilot light and nothing else, independent of the automatic fuel feed. By this means undoubtedly the pressure would hold up twenty-four hours without attention and the physician would have a carriage at his service without a moment's delay and could be on the road as quickly as by turning the crank on a gasoline carriage. I would also have it supplied with an auxiliary hand fuel pump and a hand water pump to be used in cases of emergency.

The Auto—An All Round Panacea and Educator.

By Dr. F. E. Constans.

AN UNFORTUNATE STEAM EXPERIENCE.

My first carriage I purchased after what I considered very careful investigation. I had read for months several automobile journals and visited every factory near my city. Every agent assured me that his was the ideal car for a physician, no trouble to run it in the least; just pull a thingamajig that way and another little thingamabob this way, and you are off whizzing through space, no care or worry, and making your calls in no time.

After attending the automobile show in New York I ordered my first machine, a steamer. It must be a good one, because I had seen it advertised in a medical journal as "The Doctor's Vehicle." It arrived the first week in April—a thing of beauty, with its new paint, polished nickel and big bell and lamps, etc. After very careful perusal of the accompanying directions I managed to get it started—after setting fire to it several times. Then my auto troubles began and I got them thick and fast.

I burned out boilers four or five times with two-thirds of a column water in the glass, due to check valve sticking; had troubles with engine valves not working properly, broken chains, leaks in the air tank, pump constantly out of order, broken rear axle, and, of course, punctured tires galore.

But when the air tank sprung a leak and let the gasoline squirt back out into the fire, I was lucky to escape alive, but finally I managed to subdue the flames, resulting in rather severely burned hands and a scorched carriage; after this I had it neatly painted, set in the stable and advertised for sale, with the usual "owner wants a larger car, etc." One day I received an offer about one-half the original cost of a few short months before, and with tears in my eyes (for the other fellow) I bade it farewell at the depot. I had had my experience with a steam carriage and still retained my horse which, indeed, proved less expensive than the steamer.

MOTOR FEVER CHRONIC.

But the motor fever, like malaria, is hard to subdue; it keeps springing up in the system at every carriage that goes whizzing by, and one who has enjoyed a nice ride on a fine street with the engine and machine working satisfactorily, can

never return to horses and feel satisfied, so I again took the war path for a new machine. This time I pinned my faith to gasoline, and my order was placed in February for a well known machine, which was air cooled, of suitable horse power, strong and speedy, and by the first of April I was again doing my work, but with a great difference. I soon disposed of my horses, and since then have depended entirely on my machine for all my work. It is always ready, day or night, except, of course, for usual repairs. But I have been rather fortunate in it not being laid up very long at a time, the most of my difficulty being with punctured tires, and the old, old story, "can't be mended, run deflated, new tire needed." My last punctured tire I had repaired with Dr. Norwood's suggestion of molasses 2½ pints and glue 2 pounds, and it has run very well since.

NEED OF ENCASING.

The principal objections to my carriage are that the parts are not well protected from mud, and we doctors who use machines in all kinds of weather, and on all kinds of roads, throw considerable mud and water into the mechanism. This I am having encased, and I believe the new models have already adopted this feature. My machine being air cooled I have no trouble running it in coldest weather, as there is no water to freeze, and I have been out when the thermometer registered 15° below zero.

Get a pair of good kerosene lamps, as they burn steadily, last longer, and can be lighted and put out readily. A headlight of the acetylene type is useful on special occasions, a rubber boot and top, and you are fixed for all kinds of weather.

COST.

As to the cost of maintaining a machine, my machine costs more to run and keep in repairs than one horse boarded at a livery stable, and less than two horses or less than one horse and a driver, and will do the work of four horses, and if time is money with a physician it certainly must be a money saver.

Of course the cost of maintenance is hard to estimate, as some people care for their machines themselves, and, being mechanical, understand small repairs, and are careful in running their machines, etc. My machine I keep at a station. My average expense for repairs and gasoline are about $25 per month, not counting the expense of new tires.

But for the physician nothing can equal an automobile for business and pleasure. You transact your business much quicker, and have time for the relaxation and sport of automobiling. It is always ready.

Distance is immaterial. The car can be left unattended. No hitching or blankets or fear of its getting cold. No delay about starting, and its pace is three or four times as quick as a horse's. It takes your mind from your pills and powders, gets you out into the country, acts like a tonic to your system, stirs up your liver, removes gray hairs and wrinkles, exercises your chest muscles pumping up tires and gives you an excellent knowledge of the stars when you are on your back looking for loose nuts or elusive leaks. As a general panacea and all round educator nothing can equal the auto.

A Doctor's Stable.

A Massachusetts Doctor's E[x]perience.

By Dr. A. H. Pierce.

For over a year I had been active[ly in]terested in automobiles. I could no[t] help "rubbering" at one than a could at a melon patch, and when, one June morning in 1900, a neighbor of sailed placidly past my house driv[ing a] steamer, the spring's green verdure a circumstance to the green overspre[ad] my features. I conquered my feeling[s suf]ficiently, however, to be persuaded riding in my friend's purchase. Wha[t] to own one, to just sit in the seat steer, and push the little handle on th[e] forward or back as required! Of c[ourse] any fool knew about steam engine[s;] that's all there was to a steam car. So I studied the "For Sale" colum[n of] The Horseless Age, and in about weeks found advertised a carriage I thought would suit me. I set off haste to Worcester, enlisted my fath[er-in-]law, who also was rapidly becomi[ng a] crank, and took the train to Northam[pton,] my only fear being that someone had the opportunity before me. But we safe, for the carriage was still there; in fact, the owner met us with it a[t the] station. We climbed in, all three and I was told to steer. I did, first i[n the] middle of the road and then in the g[utter,] but somehow we covered the mile half to the owner's home, by which t[ime I] felt quite competent to run one alone. took me out to ride and in a short tim[e had] me running it myself. I've always u[nder]stood why he went into the autom[obile] business directly afterward. He knew to sell. Well, I bought his carriage, ing $650, $100 less than it cost two m[onths] before. I wanted to stay over night run it back to Worcester myself the day. (Just think of it!) But the f[ormer] owner advised me not to, so I too[k the] train.

A TRICK OR TWO.

Two days later Jennette, for so the ble" was promptly dubbed by the fen[inine] portion of my household, was safe i[n the] barn. The former owner put in just three-quarters of an hour, before his for Northampton, in showing me about it." It's only just to him, th[ough,] to add that it was perfectly evident thought I knew a great deal more that automobile than he believed What joy I experienced that day! E[very]thing ran beautifully and I actually professional calls in it. The next got things going all right and could a corner with considerable éclat. I so simple! That afternoon, though, a little jar which began to open my to the fact that autos, as well as h[orses,] have tricks, although I was loath t[o be]lieve it. I backed half down a slight at my door. Then I threw the r[everse] lever forward and opened the throttl[e]

the carriage didn't start. So I opened it more, and still more again. Whiz! Bang! Something had happened, and I knew just enough to close that throttle before the backing carriage rushed up a bank, forty feet away, and butted an elm tree. The tree was senior by a century or so, and the carriage came off a poor second. I couldn't help feeling that the tree enjoyed it. The derisive laughter of some painters, a pile of whose ladders I had run over in my mad rush, disabused my mind of any doubts as to their enjoyment of the spectacle. Of course, it didn't take much study to decide that my links had jumped. I was tempted to write the manufacturers, for I knew if the matter was but called to their attention all carriages would in future be supplied with a locking device for the reverse lever. Such was my simplicity! Before the year was out, I thanked God on bended knee that He had prompted them to supply a latch for the throttle. Don't let anyone mistake my meaning, or feel that I am sacrilegious, for verily nothing short of Divine inspiration could have impelled such reckless extravagance on the part of the makers. But I had learned something of value:—that the fingers of my right hand could perform two functions, controlling the throttle and guarding the reverse lever, when necessary. Most of the points I happen to know about my automobile were learned in a similar way, and, after all, it's a good way, although at times a trifle disquieting.

A HAND WATER PUMP ADDED.

Then I punctured a tire. It was just at dusk, and 2 miles from the nearest town. There we found a man who plugged it. By this time it was very dark and our only lantern was out. We crawled over about 10 miles of country roads, in pitch darkness, never once seeing the water glass or steam gauge, and made Worcester without mishap. So much for luck. A few nights later I ran a mile, in the town, without a light on the water glass, and scorched the boiler. So much for carelessness, for, on investigation, the valve in the feed to the pump was found closed. I took the carriage to a machinist, who also was an automobile crank. He turned down a tamping iron and in a few hours had the boiler as tight as ever. I felt I had learned so much by these experiences that I ought to take a longer trip. So one day my father-in-law and I started for Boston, a matter of 45 miles each way. About 15 miles from home a defective drive tire exploded, but was quickly replaced by a spare tire I carried along. Steam seemed to waste and the water didn't stand up well. I packed piston rods and valve stems, but that didn't help matters. Twenty miles away there was so much leakage of steam that the carriage could not be operated. So we pushed it to Marlboro Junction through 2 miles of sand, on a road the inhabitants called level —I knew better, for it must have been 30 per cent. grade at least, if the exertion required was any criterion. Oh, yes! They knew what the matter was. Pistons and valve stems were leaking. They repacked them and sent me on my way, but as badly off as ever. I returned, and more careful inspection showed a hole in the steam chest gasket. This repaired, all went well to Boston. On the return we struck a hill in Southboro, on which my boiler began to prime and the water level to fall, of course. I hadn't the least idea what the matter was, but, as the boiler was about empty, I put out the fire, blew off the boiler and waited for it to fill by syphonage. It wouldn't fill, whereupon we had to push that carriage a quarter of a mile to the nearest house and part way up a steep hill. We got home pretty late that night. Neither of us ever told what time, and far be it from me to break confidence at this late hour. I had learned some more, chiefly that a steam automobile without a hand pump was a delusion and a snare. So the machinist added a pump, at the expense of about $6.

WATER GLASSES.

Then water glasses began to break, and by the time blisters had become calluses I was profficient in replacing them. An expert in Worcester told me my engine was in terrible shape, and for $50 could be made good again. I hadn't the $50 lying around anywhere, and time was scarce, so I went home, although he advised me with a shake of his head to run slow, for the thing wasn't very safe. The next day, a Sunday, having done absolutely nothing to the carriage in the way of repairs, I ran with a friend to Mt. Wachusett and climbed to the summit without mishap. This demonstrates in a measure what abuse a steam carriage will stand, and has to stand in the hands of a novice. More visits to the machine shop improved matters, and it didn't cost $50 either. A good ducking in a heavy shower convinced me that, for a physician,

SPERRY ELECTRIC.

ORIENT GASOLINE.

A TOP WAS A NECESSITY.

A light rubber buggy top was attached, at a cost of about $25. It is still in service, although, if the weather is fair, I usually take it off, as it is a matter of unscrewing only six nuts. Broken balls and cups and cones were an almost constant source of annoyance, and had to be frequently replaced. This meant considerable loss of time and some expense. Running down a steep hill I dropped over a stone, which cropped out in the road a distance of a foot or two. A broken front spring was the result. Again, running over a rough road, a sudden rattling apprised me of trouble somewhere, which was easily located in a broken reach. The machinist's services were required, but as a result I had a reach much stronger than it was originally.

FUEL COST.

My first season I kept one horse, as well as the automobile. My fuel cost just

about 1 cent per mile, 1 gallon of gasoline being enough for about 10 miles. Repairs were numerous, and would have been very expensive if done at a repair station. I was unusually fortunate in being able to command the services of an expert machinist, who was deeply interested in automobiles. His charges were always perfectly fair, and no more than he demanded for machine or repair work of any description. He made new cups and cones and brazed breaks in reaches and frame—in fact, any damage he could repair—and I always knew that, when he was through, things were stronger than they were originally. During this first season I added an auxiliary water pump and top. The remainder was repair work. I ran the carriage until December when I froze it one day in making calls and almost singed the boiler. Then I put it up for the winter.

IN A QUANDARY.

The following season I added new rims and heavy spokes, the hubs remaining the same. One new spring had to be bought. Tires were good for a little less than one season, and until I bought new rims they rim cut badly. I decided to sell the automobile that spring, because of its imperfections, and because it undoubtedly cost rather more than horses. So I bought another horse, painted the automobile and advertised it for sale. I wouldn't give it away, and could get very little for it at sale I soon found. Moreover, I wouldn't use a horse as long as the machine was in working order, so, after a bit, I sold the new horse and settled down onto steam. I had many interesting experiences and daily added to my small store of automobile knowledge. One event I remember particularly well. I was getting some oil at one of the mills in town, the carriage heading toward the building, about 20 feet away. My two year old boy, who is of as investigating a temperament as most youngsters, was in the seat. Of a sudden there came a roar from the carriage, it darted forward, and, as it whirled me to one side, I saw him holding the throttle wide open. As it passed I just managed to shut it, but not in time to prevent the carriage striking the building with sufficient force to break the arch of the front axle close to the steering post brace. As for the boy he blinked a couple of times and then lisped in a tone of mingled fear and elation.

"I DID IT, PAPA."

I had never imagined for a minute that a child could unlatch the lever. Since then I have been careful about leaving any irresponsible person on the seat. Now if that break had been taken to a storage and so called repair station the chances are nine out of ten that I would have been compelled to purchase a new front frame. But up here in the country, where they have machinists and not expert factory assemblers, it took a few hours' time, at an expense of about $4. to braze that arch with a good reinforcement, so that it was stronger than ever.

EQUINE INCIDENTS.

As to horses we have had very little trouble in this town. The season of 1900 my friend and I were the only owners. We both used the utmost care in the matter, perhaps carrying it to an extreme at times. But at all events there was no loud criticism, if there was any, and we have reaped a reward in these later days of almost universal hostility to the automobile. For here the spirit is friendly, and, as far as I know, no one of the ten or twelve owners (and they are all gentlemen in the use of the highway) has had serious trouble. I have caused but three runaways. One a baker's horse, tied with a weight, was frightened by the steam from the carriage. I had closed the throttle as I passed him, and 40 feet beyond I opened it again. He started on a walk at first, but got the weight tangled in a fence and then ran. I found the owners perfectly fair. They were willing to pocket their loss, while on my own offer I paid for damage done another carriage amounting to $8. The second (in a neighboring town) was wholly the fault of the drunken driver, and never caused me more trouble than to refuse payment to him, and write a courteous letter to his attorney. The third happened a little over a month ago. I stopped at a house after dark, and was just dismounting when a woman, who had driven into the yard to escape meeting me I learned subsequently, called to me to drive beyond the entrance so that she might get out. I ran ahead 40 or 50 feet and went into the house, supposing it was one of the girls living there who had called, and never dreaming what the circumstances really were. As the woman drove out her horse shied onto a banking, spilling her out, but doing no other damage. He ran a half mile and was captured.

REBUILDING.

Last winter I practically rebuilt the machine. I wanted a longer wheel base and indirect steering most of all. The machinist cut the reaches in two at the middle and spliced them out from 56 to 70 inches. As I wanted double springs in front he brazed onto the front arch two spring seats which we bought in the rough. I bought a pair of springs of a friend, who had discarded them as too light for use on the rear axle. A plain piece of tubing, into each end of which was brazed a plug, in which a slot was cut to fit the lever from the steering knuckle, connected the front wheels. A short lever was fastened to the right hand spindle, which was connected by a long rod to a standard Locomobile side steering post, making practically the same steering device the Mobile Company uses. On the rear axle I put in a Brown-Lipe spur compensating gear. The body of the carriage was altered as follows: The bracket and dasher were disconnected at the splice; a straight extension to each sill, about 3 feet long, was attached and carefully braced. Later on, this splice had to be trussed, since when it has held perfectly. On this base a box was erected, which I used for housing a stationary lever air pump, and for baggage. This fall I put in a 10 gallon gasoline tank, which leaves little space in it, more than is needed for supplies and tools. I bought a new burner of an Eastern firm of supply manufacturers, which was unsatisfactory. The standard burner which I attached in June has been very satisfactory. I've a pilot light of home construction, which has done very well indeed, although it is not perfect. Seat control of the fire was introduced, and the automatic fuel regulator discarded. A coil of copper tubing was put into the old muffler to make a feed water heater. At first the tubing was too light and was twice ruptured. Since heavier was substituted it has worked perfectly. An ejector was added as well, and has proved a very great convenience. On the engine I had had so much trouble with ball bearings, I tried plain as an experiment. They were merely brass castings, through which ran the steel axle and crank pins, the eccentrics being left as they were. These bearings took me on a Washington trip, but were, on the whole, less satisfactory for home use than even the small ball bearings, as they wore rapidly and would then thump terribly. During the summer I added home made mud guards and two ordinary carriage springs on the rear of the carriage. These cost less than one-half what the special automobile springs do, and thus far have been fully as satisfactory. For a headlight I used a "Solar" gas lantern, and have found it indispensable and easily cared for. This fall I bought a new Mason engine, hoping that the larger ball bearings would stand up better than the old. The total expense of rebuilding was about $225, which, of course, does not include the new engine or gasoline tank added this fall. For repairs, strictly speaking, and not including the expense of rebuilding last winter, I have paid in the three seasons less than $150. Tires are expensive, and last a trifle less than one season. Gasoline I buy in lots of from 50 to 100 gallons, paying from 11 to 13 cents a gallon. I store it in a large iron tank furnished me by the dealer. At present I consume a gallon to from 6 to 8 miles. On tour the consumption is about 1 gallon to 10 miles. The difference is, of course, due to waste while standing.

THE DAILY REGIME.

Under ordinary circumstances the carriage is fired up by 8 in the morning, and is usually under steam until 10 in the evening, although occasionally the fire is put out at 6. I employ a young man, who is man of all work, as well as chauffeur. Without him I should not attempt to use my automobile, for the time consumed in preparation and minor repairs is considerable, and one's hands become soiled to

such a degree as to render it impossible to make them presentable. Exclusive of this man's services, and they would be necessary whether horses or automobile were used, the cost per mile figures up less than 15 cents. A very conservative estimate of what horses have cost me during the past few years is over 10 cents per mile. The first season I kept one horse, using him only when the automobile was laid off for repairs. The second season I kept one horse, and part of the time two. The season just ended I had my horse at pasture from May to October, and hired a horse a half dozen times perhaps during this time. To get along comfortably with a carriage like mine, a physician should have either another automobile or a horse.

A COMPARISON.

Another factor enters into the question of transportation with a doctor, however. A man, busy in a town or country practice, is in his carriage pretty much all day long, and usually late into the evening. To get about with celerity, speed and comfort is of importance. There is nothing more wearisome to most men than to urge a tired horse, and unless one keeps a stable of at least three horses this cannot be avoided. With the automobile this element is wholly eliminated. In an emergency, or if much hurried, a speed at least 50 per cent. greater than with a horse can be maintained. With me a long drive into the country has become a pleasure instead of a task, and is usually a relaxation. These points mean a saving precisely as much as if they could be measured in dollars and cents, and should be given due weight in comparing the relative values of the two methods of transportation. In many ways my carriage has been a source of great comfort, and as a means of relaxation, or as a sport pure and simple, nothing short of a yacht can hold a candle to it. To do a hard day's work, driving perhaps 30 miles, and then to be able to run over to Worcester, a 25 mile trip, after 8, places the automobile beyond comparison with horses. On the other hand, to be delayed time after time on a busy day, by minor breakdowns, is very irritating, and turns the balance as far the other way. I have no doubt that with a somewhat stronger and better designed automobile my practice might be done more cheaply than with horses. When there is much snow, or the frozen ground is very rough, any automobile made at present cannot compete successfully with horses. Still, with all its faults, I am not willing to give up the motor carriage.

I have had no experience with gasoline carriages, but I feel that, with either a steam or explosive motor, a well designed and constructed carriage is adapted to the physician's needs. As yet I know of no such carriage brought to the point of perfection it should be for such special work. And until the manufacturers recognize that a physician's requirements are far more exacting than those of the average pleasure seeker, the purchase of automobiles by doctors will be more limited than it should be.

Eight Months with a Light Gasoline Machine.

By Dr. H. H. Cooper.

I was the first to own and use an automobile in this town. The town's people, and the other doctors especially, watched "my experiment," as they termed it, very closely. Some of the I-told-you-sos were really provoked at the end of the first month because I had not been towed home by horse power. I have kept a careful account of all expenses and give them for the benefit of your readers. It had cost me annually for fifteen years to keep a horse about $240, namely, $208 for board and care, and from $25 to $32 for shoeing, according to how much sharpening was necessary through the winter. To this is to be added repairs to harnesses, carriages and sleighs, including repainting, varnishing, etc. I had used a bicycle for seven or eight years, so as not to buy another horse. After using a horse in my practice at the above cost, supplemented with 20,000 miles actually covered on a bicycle, I sold the team, gave the bike to a boy, and bought a gasoline automobile. I began about April 1 and used it continuously up to December 1, eight months, during which time I hired a stable team twice, and rode on the electrics some in bad weather, as a matter of choice; day or night, it mattered not, the car was always ready to go. It never failed to start or to stop. I never frightened a horse, though I did compress four dogs. I did all my work and all my pleasures, covering 3,500 miles in all. The cost was as follows: For legitimate repairs, $1.95; gasoline, $25.95 (160 gallons); batteries, $7.20; a total of $35.10.

STRIPPED A SPROCKET.

There were some other expenses which you could not rightly charge up to the car. I attempted one day to pass over a road where the street railway company were cutting down a grade. I got the auto into the sand so deep that both axles rested on the sand. I tried to pull out, and as a consequence, stripped three teeth off the rear sprocket. I ran into the corner of the barn one day and twisted the steering device, had some tire troubles, express charges, and did some experimenting, all of which cost $25.10. Now, if any reader wishes to add these two items, he can easily see what eight months' automobiling has cost me.

There is a chapter of great pleasure and solid comfort that could be added. All this labor and pleasure was not enjoyed by the operator alone. Selfishness is not an attribute of the true automobilist. Others, too, have shared my pleasures.

Six Months of Satisfactory Use.

By Franklin W. White, M. D.

Six months ago I bought a light gasoline runabout, of 4 horse power and 800 pounds weight, and have used it daily ever since in making professional calls, averaging about 15 miles a day. My total mileage is 2,650 miles, one-half of it over good roads in Boston and its suburbs, and the other half over rather hilly and stony roads at a summer resort.

My experience and that of many friends lead me to believe that the simple gas engine in careful hands needs decidedly less repairs than the light steam machine. A further difference is that the gasoline machine can safely be left standing for hours outdoors in freezing weather by putting an anti-freezing substance, such as glycerine or calcium chloride, in the cooling water, and the steam machine cannot be so protected against the danger of freezing and bursting water pipes.

CANVAS PROTECTOR.

My automobile as it left the dealer's hands was rather a fair weather machine. While the driver could be protected from bad weather by a top and boot, the machinery was very much exposed, and on wet days the wheels had every opportunity to sling mud freely all over the engine and its bearings, the commutator and the chain. This condition was damaging to the engine and entirely unnecessary. It was simply remedied by providing a canvas apron from under the carriage running from the radiator to the rear axle, and supported by buttons along each side of the carriage body. This protects all the running parts beneath the carriage and greatly lessens the wear, and improves the running of the engine and chain. It makes it vastly easier to keep the parts clean and well oiled, and incidentally reduces the noise of the engine and exhaust till it is hardly audible on city streets. The manufacturers ought to provide better protection for their engines if they expect them to run well in all weathers, and not reserve these features for endurance contests.

I think that a light machine if well built is better than a heavy one for a doctor's use where the carriage is mostly used for only one or two people. Strength lies not in mere weight but in the proper balance of parts, and the difference in size and wear of tires makes a decided difference in running expenses.

The cost and running expenses of my machine may be of interest:

Automobile, mud guards, boots, lamps, two extra tires and extra spark plug	$736.00
Running expenses, six months (including insurance and $15 a month for stabling)	$112.93
Repairs and new parts	31.45
Interest on first cost at 4½ per cent.	16.56
Mileage, 2,650 miles	$160.94

It is fair to say that in the summer time

when I was out of reach of repair shops I saved some charges for labor by replacing parts and doing occasional odd jobs myself. The cost per mile is approximately 6 cents, without allowing for depreciation of the carriage, which is in first class condition, shows few signs of wear, and runs much better than when new.

There is an important fact which the purchaser of an automobile often forgets, namely, that it is an engine as well as a carriage, and that the man who runs it is in a certain sense the engineer. If he has no interest in engines and expects simply to "press the button" while the engine "does the rest" he will have much trouble and many repair bills, and probably conclude that automobiles are not practical vehicles. If, on the other hand, he has sufficient interest to study his machine a little and learn to understand its operation, and is fortunate enough to get one of the simple, well built machines which are fairly numerous on the market today, his experience will be a very different one. If he gives it the same care and interest which a good driver gives his horse it should give him great satisfaction and be a source of economy rather than expense.

In comparing my machine with a horse for professional use, the machine has the advantage in everything except use over snow. It can be left conveniently waiting at all hours of the day or night, without a driver, in a way no horse could stand. It travels much more quickly and is a great time saver. In busy times it will do more work than two horses. Its cost of running has been somewhat less. In reliability thus far it has so closely approached the horse that there is no practical difference. I make it a point to look over my machine carefully once a week in the stable, and keep it well adjusted, so that when I use it it is ready to start promptly and run steadily. In this way I have almost entirely avoided vexatious stops on the road. I have been towed home once only and that was not the machine's fault, but my own. I started to make a call when I knew that the electrical circuit was not in proper order.

In snow a horse has a decided advantage over my automobile. With even a few inches of fresh snow my machine is not speedy and has little power for hill climbing. When the snow is beaten down hard it runs much better, but on the whole it has too little power to use satisfactorily for business purposes when there is snow on the ground.

As I look back over the months of comfortable daily use of the machine, the many weeks when nothing has been necessary except oiling the machine and filling the tanks, I am more than satisfied with it from a user's point of view, and am very glad to present a pleasant side of the picture.

Dr. A. R. Good, of Philadelphia, has used automobiles in his practice for three and one-half years.

Nearly 15,000 Miles in One Year in Massachusetts.

By Dr. H. C. Martin.

After carefully weighing the evidence pro and con of my confrères, I decided, in the summer of 1901 that the automobile was certainly more than a plaything and was actually practical for a physician to use in his practice. At that time three of my friends had launched into the whirl, two with steamers and the other with an electric, while I favored a gasoline. Soon, however, my friend of the electric purchased a gasoline wagon, which gave me an opportunity to observe whether my convictions were right or wrong. After about a month I concluded that for my particular use that particular wagon would fill the requirements, so on July 17, 1901, I became the happy possessor of a gasoline three wheeler. After about a half hour's instruction I started for my home, about 3 miles away, arriving without any difficulty. Since that time I have used that same wagon in my practice continually with the exception of a few days, when the snow was too deep, or tire difficulties prevented. Trouble with the mechanism has been the least annoying feature of my experience. My position is a particularly bad one, as my residence is 3 miles from my office, 1½ miles of which are over comparatively bad roads, with two hills of about 12 per cent. grade. From July 19, 1901, to July 17, 1902, I covered 14,220 miles in that wagon and it is still running.

LIMITATIONS OF THE AUTOMOBILE.

Whether the automobile will entirely supplant the horse as a mode of conveyance for all physicians is very doubtful in my mind. There are several reasons why I have this impression. First, in some localities the roads at the present time are such that to use an automobile exclusively would be utterly impossible. This statement may seem to some people an absurdity, but it is a fact. I have seen drifts of snow in Massachusetts 20 feet deep that ran directly across the road. My horses could make a detour through fields, over stone walls and fences and make it possible to reach my destination, where, unless an automobile had wings, it would be useless. Second, some physicians have such a lack of mechanical knowledge that the operation and care of even a wheelbarrow would be beyond their capacity. Third, the first cost of an automobile is so great that it is beyond the reach of many of the younger members of the profession. Fourth, the ordinary road speed of an automobile being at the rate of 8 to 15 miles an hour makes it a very cold and disagreeable method in winter in the North. These are some of the reasons why I think automobiles will never become the universal method of conveyance for physicians.

ADVANTAGES.

On the other side, under certain conditions I consider the automobile the ideal method of conveyance. If the possessor cannot afford the services of a man skilled in the care and operation of an automobile he must of necessity possess considerable knowledge of mechanics and have an even temper. If the wagon is properly cared for, it is always ready to go at an instant's notice. Its speed is of great value in making emergency calls and saves a great deal of time in doing routine work. In spite of corrections of minor difficulties and making slight repairs on the road the physician with the automobile can do more work in the same time than he could with a horse and do it more comfortably. In running over 16,000 miles my wagon has been disgraced only twice, having been obliged to resort to the "hay motor" to get me home.

Many times I have stopped on the road to repair a broken battery connection or put in a new gasoline tube, which takes no more time than to repair a broken harness or remove a stone from a horse's foot.

PREFERS THE AIR COOLED GASOLINE TYPE.

I wish to state the reasons why I consider the gasoline propelled vehicle, air cooled, the proper type for a physician's use.

A physician has cares enough without adding to his burdens a steam gauge, an air gauge, a water glass, 10 gallons of gasoline under 60 pounds pressure, with a hot fire in close proximity.

For winter use it is out of the question. It must be kept moving or the pump will freeze; the steam gauge will freeze anyway, and with a frozen steam gauge and a frozen pump I would just as soon be in a room where a two year old boy was playing with a stick of dynamite and a hammer.

A gasoline motor has its disadvantages as well as the others, but with an air cooled motor as efficient as mine, summer or winter, you have a wagon that will run if any wagon could run. A water cooled motor would be useless for a physician, because, in spite of the "non-freezing" preparations, somehow they *do freeze*.

My advice to a physician who is contemplating the purchase of an automobile to use in his practice would be: Buy a gasoline wagon, air cooled, of 6 to 10 horse power, with plenty of carrying space, the parts made of suitable material, and large enough to stand hard usage; and above all, buy a wagon made near your home, for two reasons—first, the ease with which you can have your repairs made, and second, because the manufacturer will be a little more anxious to keep you going.

Automobiling for Business and Pleasure.

By Charles S. Dennis.

I am using an automobile for two purposes, business and pleasure, and after three years' costly experiment and experi-

ence, I believe I am using it to advantage. I have a large practice, visiting many patients miles away in my carriage. I have a heavy, standard make carriage, and have had my share of trouble with it—a little more than my share, perhaps.

The other day, while I was out for a spin through the pleasant woodland roads, I had a little trouble with a loose nut, which I fixed in a moment or two, but I do not expect to get the grime and oil off my hands for a week yet, and I've been using benzine, soapine, scrubine and a dozen other cleansers that seem to contain almost enough chemicals to burn one's hands off. But I'm missing my point. Supposing I had been on a professional errand when that nut got loose, and to treat a new patient. Well, nine chances out of ten he would have looked at my hands, and rolling toward the wall, would have exclaimed: "Back to the forge! Back to the forge!" No doctor can expect to advise his patients unless he looks like a doctor, and has the skillful looking hands and fingers of a physician, not the grimy looking fingers of a blacksmith.

THE PLEASURE OF RIDING.

There is joy in living, the poets tell us, and I find there is joy in automobiling. With the carriage running smoothly, the roads well surfaced, the air bracing and the mind tired by enough hard work to be quiet and contented, just let your carriage travel wherever fancy leads it. We have beautiful scenery in this part of New England, the North Shore having been considered a place of rare beauty ever since John Smith, Gosnold and other explorers coasted along it in their strange ships. Views of the rough, broken seashore and broad ocean are offered on one side, and from the crests of hills we look down upon a magnificent panorama of tilled field, pasture lands, green woods and pretty villages. The carriage spins over those roads just as one's mind fleets through a dream Care and worry are forgotten in this pure delight, and we return home with a year added to our lives, the best return from our investment in an automobile.

Oh! yes, we often tell our troubles and seldom our pleasures in automobiling, but I think we mention our troubles, not for sympathy, but for practical advice, which will lead to their cure. If our pleasure in automobiling did not exceed our troubles none of us would want the vehicles.

THE DARKER SIDE.

The last time I wrote you I thought my troubles were all over. I had paid enough money to machinists and others to have my carriage put in perfect order, but I find that it is the same old story—"if you want a thing well done, you must do it yourself." I got my carriage fresh from the machinist's, and went on a 20 mile run, and when I got home the brake handle broke off. A new one cost me $3. Later I started for a ride, and had gone about 7 miles when the carriage stopped. I climbed out and found that the arm which holds one of the spark points on the under side had dropped down and needed to be tightened. It had to be fixed to make the carriage run, and the spark plug had to be taken out, a very dirty job. Next, the power seemed to be weak, and I found that the needle valve was broken off. After fixing this I had a good run at a speed of about 15 miles an hour. In the afternoon of this day I made a long run, averaging 16 miles an hour. I have come to the conclusion that people who never run faster than 5 or 6 miles an hour are those who write that they have no troubles and breaks. I find, in my own experience and those of my friends, that a high speed carriage needs much attention, and often breaks, even with the best of care.

CARRIAGE COMING APART.

While spinning over a smooth country road one day I was surprised to hear a farmer shout, "Look out, your carriage is coming apart!" I looked around and saw half the rear axle part way off, but still holding up the carriage. I ran to the side of the road for repairs. Troubles never come singly—I had left my repair kit at home. I walked 2 miles, rode 4 in an electric car and I got home just too late to start back with my repair kit. The carriage remained on the roadside all night, and, to cap my hard luck, a drenching storm unexpectedly came up.

All this trouble was caused by a trifling thing, the machinist not having properly fastened the screw of the differential gear. I think bolts and machinists are the bugaboos of automobiling. Bolts can be bought for 2½ cents a dozen at a hardware store, but let it be known that you want them for an automobile, and they jump to $1.20 a dozen.

THREE CRANK SHAFTS BROKEN.

One summer day I was having a beautiful ride, having covered 30 miles in a little more than an hour and a half, when I heard a strange noise. I jumped out and found that the crank shaft was broken, but that I could run with this break. This makes the third crank shaft I have broken in three years, an average of one a year. The first one cost me $75 (this included putting it in), but the last one cost only $25 (I put it in myself). Experience is costly, but it pays in automobiling.

One machinist told me that my machine was out of line and that I needed a new frame in my carriage. This would be costly. Other machinists told me that they couldn't see why the crank shaft broke, and even the makers of the carriage were puzzled. I took my carriage apart and found the sprocket wheel made in two sections and filled in with rubber. Oil used for lubricating had eaten into this rubber, and when the carriage started, or was running down hill, it would advance a half turn on the sprocket and bring it up with a jerk. Of course, something had to give, and it was the crank shaft in this case. In other carriages the chain usually gives way. I fixed this trouble for about 20 cents by digging out the rubber and running in lead.

TAKE WARNING.

Keep away from machine-shops is my advice to automobilists. Take care of your carriage in the first place, so you won't have to frequently send it to the hospital. In the second place make your own repairs. Making and repairing automobiles is a special industry, and the average machinist and blacksmith knows more about shoeing horses than about repairing automobiles. I've found, in my three years' experience, that to get the best results from a horseless carriage its owner must be an electrician, a machinist and an engineer. I take my carriage apart and put it together again, and I'm a busy man. I don't have many troubles that I cannot fix myself, and none that I cannot fix up to get home. Machinists are always finding trouble at the wrong place. When you ask them to fix a chain, it would be all right if they only fixed the chain, but they usually work on three or four other things, keep your carriage a week instead of a few hours, get it out of adjustment, and you pay the bills. Keep away from the repair shops.

TIRE TROUBLES.

Trouble with tires have made me tired. Also they have wearied my bank book. I have been using one make for two years now, but have changed. I started on a run to Newburyport, about 25 miles away, and I had not gone 10 miles when a rear tire, a new one, began to leak. When I got to Newburyport the tire was flat, and there wasn't a man in the town who could repair it, or furnish a substitute tire. I didn't want to leave the carriage, so I started home with a flat tire. After a 4 mile run the tire came off, and there was nothing to do but to keep on with the rim bare. I finished the ride, making a little more than 20 miles in a trifle over an hour, with three tires and a flat rim. I think that is a good testimonial to the roads we have in our parts, for my carriage is a heavy one. But the rim was about 8 inches wide and flat.

I took the wheel off, shaped up the rim and got a new tire. This one got flat in the carriage house before I took the carriage out. I wrote the manufacturers about it. They said it was rim cut. I told them that I hadn't been out, and they answered that I did not know what a rim cut was. (But I do know what a "roast" is.) The manufacturers asked me to send them the tire, and I did so, but they charged me $3 and said the tire was punctured. This tire was no good anyway. I used ten tires of this firm's make, and four of them were porous. The firm made me an allowance of one tire for them, and the only satisfaction I got from trying my pa-

tience with this experience was inducing friends to try another make of tires.

A GOOD WORD FOR TIRES.

There were two sides to the shield in the old story, and I suppose there are two sides to everything, even tire troubles. I have on my carriage one tire that has been in constant use for three years. It has a crack in it about 8 inches long, and about one-half inch deep, and it has been in this condition for four months. I have bound it round with tape, and it still holds up, and has worn out several new tires. Oh! if I could only get a set of tires like this battle scarred jewel.

COLD WEATHER TROUBLES.

In my early automobiling days I thought a carriage could not be used in cold weather. I always had trouble in getting an explosion on cold days. I keep my carriage in a cold stable. However, I got over these troubles by putting hot water on the carburetor.

In New England, where we have big snowstorms, many people laughed at the idea of keeping an automobile in service the whole winter, but I have driven mine through 11 inches of snow at a speed of 10 miles an hour. At one time I had a lot of trouble climbing hills, having to use the hill climbing gear even on a small hill. One day I shifted the cam a little, and cut the muffler out, and now I travel at top speed where I formerly had to use the hill climber.

A CHANGE WANTED.

I was talking with a friend one day, and he said he had a steam carriage which he wanted to sell. He wanted a gasoline carriage so that he could start in a minute without having to wait to get up steam. I hope he gets his wishes, and also that he doesn't have the troubles I had in my first three months. The electric carriage looks to me like a good one for a doctor. A friend of mine had an electric carriage which he has run every day for two months, and repairs have cost him only $3; but he knows how to use a carriage.

SUMMING UP THE EVIDENCE.

As an attorney retained by the automobile, in the case of the automobile vs. the "hay motor," I must plead for the automobile, but the doctors, who are the judges, will each have to consider their particular cases. I use a car with good results, and I am proud to say it because I've seen some doctors go back to their old "hosses." Doctors are courageous in learning things, and they need courage in learning the best makes of automobiles and how to run them. One thing that strikes me is the likeness of automobiling to our living—"the little things trouble us the most." When a carriage stops on the road, it is seldom that the crank shaft is broken. As a rule, some nut has loosened or some little point or cog is a fraction of an inch out of place. Now, a doctor wants a reliable carriage, one that he knows will arrive at the places he starts for. Perhaps it will break once in a while in his first days with it, but if he is patient he will soon learn to look it over before he leaves the stable and try to fix the difficulties. When he gets started he finds that it will go somehow, and he will forget his troubles. As I have said before, I use a carriage to advantage, for both business and pleasure. I have had days when it seemed as if my carriage sped along as smoothly and with as little trouble as did the Salem witches upon their magic brooms in 1692, and days when riding seemed worse than bouncing along in a springless freight car on a rocky road or walking. But I still have the firm faith that automobiling is a royal sport, and I must ask for a decision in favor of the automobile, when it is perfected, as the best carriage for a doctor.

THEORY VERSUS PRACTICE.

On the face of the situation an automobile is the ideal carriage for a physician. It covers distance rapidly, is good for many miles, stands without hitching, is ready at a moment's notice for night service; but there is the bogey of breaks and repair shops, from which, let me hope for the doctors and mankind, the manufacturers and inventors will some day deliver us.

Pennsylvania and New Jersey.

Hints to the Beginner.

By Dr. Henry Power.

For the last five years and a half I have used an automobile in my practice almost daily, and have also used it for pleasure riding. During this period I have cared for the carriage myself, and have made repairs and radical alterations where possible and necessary. I have not owned a horse during this entire time, and now feel very awkward with a pair of reins in my hands; a horse is so difficult to steer.

As far as I can judge the electric carriage is not practical for the physician's use, by reason of its great cost of upkeep. The steam vehicle is practical in summer only, as no busy practitioner could think of drawing off the water from the boiler and tanks each time, day or night, when making a stop of any length. Failure to do this might result in very serious injury from freezing and consequent bursting of pipes, etc. This difficulty alone is sufficient to convince me as to the motive power for physicians, and I have acted upon this conviction. For those, however, who expect to employ a man to do nothing else than look after their carriage, this feature is of less importance. In a general way it may be said, however, that for our purposes the disadvantages of the steam machine are greater than those of the gasoline machine.

The reason given me by most of my professional friends why they do not use an automobile is that they are waiting for the machines to be "perfected." The true reason is that they have no reliance in their own competence in matters mechanical. It is the user, good friend, and not the auto, that needs most to be perfected. Again, I am told that automobiles are to be shunned because "they frighten horses so." A queer sort of logic, indeed!

When I say, get a gasoline carriage, that is as yet only half the battle. There are many of different kinds. You who hesitate about the price I would advise to get a moderately good second hand machine, at least to learn the art of driving. A machine bought second hand is only a second hand machine when you wish to sell it, and in this manner you are likely to pay less for your "special course in mechanics."

Among the qualities most desirable in a gasoline automobile for a physician's use is, first of all, simplicity of construction. Multiplication of parts is a serious fault, for each part must first be paid for, then be kept in order, and from time to time be renewed. Next in importance to this point is the ratio of weight to horse power. I am satisfied that a two passenger carriage should not weigh more than 1,200 pounds, with a full charge of supplies. Such a vehicle should be equipped with a motor of not less than 8 brake horse power, or 1 brake horse power for each 150 pounds. This requirement in power is not to permit high speed, but for rapid hill climbing, the possibility of which saves you more time than high speed on the level, for in a rolling country, you are climbing most of the time. It is also of advantage to be able to accelerate quickly in traffic. Under such conditions the value of a clutch that holds firmly yet does not grip violently is also appreciated.

The requirement regarding ratio of motor power to vehicle weight makes it practically necessary to have a motor of at least two cylinders, as the vibration of an 8 horse power single cylinder engine would be too great for a 1,200 pound carriage.

Another subject of great importance is the cooling of the engine cylinders. There is no doubt that air cooled motors require less attention than those provided with water jackets, and the efforts of several firms turning out air cooled motors are in the right direction. However, the majority of the best known carriages of today are water cooled.

With ample motor power two changes of gear are sufficient, but three forward speeds are always a convenience, and I think are worth the extra complication. All the mechanism should be fully protected, particularly on the under side, as mud will do more harm than rain or dust. One of the most common defects is an unprotected chain to the rear axle. The most important parts of the mechanism should be quite accessible for inspection and repair. Among these are the crank

bearings, valves, sparking mechanism, carburetor, clutches, brake and oiling mechanism.

An intending purchaser cannot do better than engage an honest man thoroughly acquainted with the subject to give an opinion on the vehicle in question. A case recently came under my notice where an "expert" demanded $25 from the owner who wished to sell his machine for a favorable opinion regarding it. The "expert" was supposed to be acting in the interest of the man who wished to buy the carriage. It seems we may expect in this matter all the tricks of the horse trade.

Without the advice of someone who has experience in this line the novice is likely to be misled and to regard as advantages what are really serious defects. A series of "don'ts" will therefore be in order.

Don't buy a carriage which is high from the ground or short between axles. Avoid small wheels; none smaller than 30 inch wheels should be used, and 34 inches is none too large. Small tires are bad, but there is much to be said in favor of solid or semi-solid tires on the front wheels. The carriage ought to have mud guards, and those over the front wheels should have a leather extension reaching almost to the ground.

Avoid a machine in which it is difficult to get at the mechanism, but also avoid machines in which the mechanism is always uncovered. The chain should be ample in size, and the brakes easily accessible and very simple.

A Light Weight Gasoline Machine Recommended.

By Alfred C. Smith, M. D.

During the years 1900-01 I drove one horse, using a 325 pound pneumatic buggy, 9,017 miles, at a cost of 3½ cents per mile. This was for the cash outlay, as I take care of my horse myself, as I also do my motorette. Often during this time I had a tired horse that it would have been a satisfaction to allow a few hours' rest, but the demands of my practice were such that both man and horse had to continue their work. Finding it necessary to add another horse to my equipment in order to attend to my work, I considered the advisability of trying the automobile, though my work is over the roughest and steepest roads in Western Pennsylvania, having many grades of 14, 16 and up to 20 per cent., covering a distance from a few feet to three-quarters of a mile in extent.

The test has been made during the past seven months, from May 1 up to the present time, with the following results in favor of the automobile: I have traveled 3,844 miles, with one puncture, that took fifteen minutes to permanently repair (Dunlop detachable tire), it being caused by a button from the top shaking out, falling in front of and being picked up by the rear wheel. The consumption of heavy grease for the gears (driving) was 80 pounds, at a cost of $9.60. The consumption of gasoline was 147 gallons, at a cost of $20.58, and one battery and two spark plugs, at a cost of $6.25. As to repairs, I have lost a few screws and bolts, which cost $1.47 to replace and for wear, a few fibre brake bands, at a cost of $1.50, with covers for the rear tires, at the end of 3,316 miles, costing $25, making a total cost for 3,844 miles of $66.35, or nearly 1¾ cents a miles as against 3½ cents for the horse.

The care and repair of the machine I have attended to myself, thereby learning the construction of my machine all the better, which is the first important factor in the successful operation of a machine. Delays on the road have not amounted to over two hours, mostly caused by the breaking of spark plugs, with the exception of one stop of half an hour from a broken clutch band, which a rivet repaired.

From November 7 to 15, eight days, I traveled 700 miles, making 116 calls, at points radiating in opposite directions to a distance of 10 to 12 miles respectively from my office. Had this work been attempted by horse and buggy it would have required at least double the time and change of horses, or in other words, four horses, to have done it in the same time. At this rate it would have required a driver to take care of them, as it would have taken most of the twenty-four hours to drive 90 miles each day, allowing time to attend thirteen calls, one of which was an operation, requiring my presence for several hours.

I traveled 451 miles with a consumption of 45 quarts of gasoline and 5 pounds of grease, or a distance of 40 miles to the gallon.

As to the convenience of the machine for night work, it is fine, there being no time lost in starting, going and in stabling on the return.

Of course, the use of the machine is limited in the muddy season, where there are mud roads to contend with, but where macadam roads or paved streets can be used there will be very little restriction to its use.

To sum up, I think the well constructed light weight gasoline machine is the one for the professional man.

Automobile versus Horse.

By Dr. Daniel Longaker.

One of the most frequent questions put to us is: Is the automobile cheaper to use than horses?

The question is pertinent and may be answered at the outset. Up to a comparatively recent time my reply was unqualifiedly, no; it is not. Now I am inclined to give a qualified no, and I soon hope to convince myself and others that the answer may be an unqualified yes. The reason for this hope will be evident after a little calculation based on some figures I have obtained from friends who keep up to date driving establishments, spick and span.

A busy physician who undertakes to drive daily in his professional rounds in one of our large cities will require an outfit something as follows:

Standard doctor's buggy	$300
Cut under	400
Single hand made harness	50
Double hand made harness	100
Two horses at $150	300
Total original cost	$1,150

Or we may deduct $650 (400 and 150 + 100), which will leave $500 as the cost of a single horse and buggy, a rather meagre driving outfit, which will hardly prove adequate to the exacting work and long drives frequently demanded. My medical brethren will bear me out in this. Every busy family doctor who drives keeps at least two horses and as many carriages, using a different horse on alternate days, or one in the morning and one in the afternoon; one type of carriage for fine weather and another for bad. The higher figure may therefore be accepted as a basis of comparison. We may compare the cost of an auto with this. One may be selected capable of doing the work of two or perhaps three horses at a figure not greater than that just named. I hope to show that for this outlay may be obtained an auto driving outfit, the equivalent of several horses and as many carriages. It will have two tops, one for fair weather and a brougham for foul; a removal or folding seat and ample power to carry one, two or four adults over any ordinary roads. With care it will outlast the old style horse drawn rig and give a vastly greater mileage in the meantime.

So much for original cost. What about maintenance?

Some of my friends find economy in stabling and feeding their own horses. The cost may be approximated as follows:

Stable rent, per annum	$100
Oats, hay and straw @ $120 per horse	240
Shoeing @ $24 per horse	48
Hire of man, $20 per month (including meals)	240
Harness repairs, painting of carriage	50
Sundries, brushes, blankets, combs, etc.	25
	$703

Coachman's uniforms, cost of heat and light, interest on investment and depreciation have been omitted, as they may be considered amounting to the same with either plan of driving.

Nor has anything been said of the cost of services of the veterinary surgeon; ultimately, I hope, the repairs to a first class motor may be so limited by intelligent care as to balance this uncertain item. This rather elaborate outfit may be estimated to afford a daily drive of 20 miles—a little over 7,000 miles per annum. Costing $700 for maintenance, the cost of driving a single mile is exactly 10 cents. How does this compare with the cost of driving an auto mile for mile and day after day for a year? According to my own experience detailed

in previous papers this was more than double. Many reasons for this exorbitant cost no longer exist, and I am sure those figures are useless as a basis of calculation of the cost of future auto driving. I therefore venture to make the following estimate for one year, driving 20 miles per day, or a total of at least 7,000 miles:

Stable rent	$100
Fuel	70
Lubricating oil	10
Battery	15
Painting	25
Tires	100
Services of man	240
	$550

Beyond the $25 for paint and varnish nothing has been said about repairs. What will these cost? At the outside, in this stage of development, this item should be less than the difference between $703 and $550 or $150. There will be occasional cases of expensive destruction of engines through breaking connecting rods, pistons, shafts, cranks, but these will grow infrequent with the adoption of better types. Less frequent perhaps and no more costly than the occasional loss of a valuable animal. The original cost of a good auto is therefore about the same as a complete horse driving outfit, and its maintenance ought to involve no greater outlay. In contrast with the figures of my earlier experience I may here say my last 1,000 miles were driven at an actual cost of $22.89, over six dollars of this amount being for tires and very little for repairs (not over two dollars) of the most insignificant nature. I confidently believe the next 1,000 miles will be made at no greater cost, including all necessary repairs.

BE YOUR OWN MECHANIC.

If economy be an object, the main item of expense, the hire of a man, may be saved. An average of half an hour daily is all that is required in the necessary attention, and the time is about equally divided in the morning and evening. At rarer intervals more time will be required, as in adjustment and cleaning of chains, brakes, etc., and at still rarer times in grinding and cleaning of valves, pistons, repacking heads, etc. I see no reason why a physician should not don a pair of working gloves and personally do this work. It is recreation which all of us need, and if we wisely utilize our time we'll find abundant opportunity for it. Only in this way can we qualify ourselves for those vacation tours to which many of us look forward. When distant from mechanics we do not want to be helplessly and hopelessly left by the wayside because of some trifle which the slightest knowledge would remedy. I have suggested the necessity for intelligent care, and we may here inquire in detail just what this means. The best results will be attained if the doctor thoroughly understands his own machine, and perhaps gives it some of the same kind of attention that one would bestow on a fine animal. Under this head comes proper

HOUSING.

The ideal room for storage is on one's own premises. It should be so near the house that it may receive heat from the hot water or steam heating plant which warms the living rooms. Whenever wanted the heat can be turned into the radiator in the auto barn, thus facilitating the initial start in the morning, and allowing little attentions to the machinery without suffering personal discomfort. I can speak feelingly on this point since I have struggled in a cold barn for three winters. During the first heat was supplied by an oil stove, during the second I sought warmth in a public garage during the coldest weather. During the present I shall probably put in an oil heater, although there may be some danger of fire. I have just been compelled to dress a sticking exhaust valve, which laid my carriage up a few days ago. For several days it gave occasional trouble and finally stuck firm. There was no compression. It was a case of pushing the wagon home. It was like working in a refrigerating plant to dress that exhaust valve, and I have no desire to repeat the experience.

COLD WEATHER HINTS.

I may profitably give an account of the tricks I find necessary to overcome winter troubles. All water cooled motors are liable to freeze, and in doing so the cylinders may crack, therefore precautions against freezing are imperative. The best and only way to overcome this danger is to use a solution of calcium chloride, made in the proportion of 1 pound to 3 pints of water. It is cheap, effectual and does no harm to tanks, jackets or tubing. This year I attempted to operate without the anti-freeze solution, thinking the emptying of the cooling water through pet cocks would render the anti-freeze chemical unnecessary. Our first cold spell dispelled this illusion, and I am now prepared for zero weather.

I personally know one of our veterans who cracked his cylinders a year ago because he did not adopt this precaution. His man failed to empty the tank. On a very cold day, unless one keeps the engine running, the water in the cooling coils so generally used will freeze in a very short time. I repeat, put in calcium chloride in proper amount, 8 pounds in 3 gallons of water, and avoid the danger of freezing.

LUBRICATION.

Remove the cylinder oil cup and take it and all lubricating oil cans to a warm place when the day's work is done. In the morning the piston is deluged with warm lubricating oil, and after the crank has been turned over a few times the cylinder cup is screwed into place. Every bearing receives its dose of warm (light) lubricating oil. The incased gears are likewise treated with lubricating oil every few days and not with the viscous cylinder oil, the use of which in summer is here proper. A tea kettle of hot water (boiling hot) poured over the supply pipe will prove an unfailing remedy in the generation of an explosive mixture. I have never known it to fail, and I use the same gasoline in winter as in summer. It is not 76°. The long supply pipe leading from the carburetor to the inlet valve may be a bad feature in cold weather operation, for after standing a long time on a cold day the hot water sometimes becomes necessary. I have not tried a higher test gasoline because the remedy is so simple. When once the engine is in motion no further trouble is experienced.

Points often neglected are lubrication of springs and the joints of the steering mechanism.

I shall substitute a hollow tank placed horizontally behind the seat connected to the jacket by a siphonage system, and this will dispense with my pump and the radiating coils. A funnel shaped opening will project over the side, scoop in the air and drive it through the tank. In winter time, at least, it will keep the water from boiling. It will carry two more gallons of water than the present system, but the weight will be more on the rear. And I shall remove about 40 pounds when I take off the radiating coils from the front. Where, as in my carriage, the muffler is under one's feet, one has to substitute for the wooden floor a grate like iron structure to afford an efficient foot warmer. This I have done, and with a good lap robe find an immense comfort in it.

SQUEAKY SPRINGS

soon develop if one is out in the rain much. Remedy: Jack up the body and separate the individual spring plates with a screw driver, then treat the spaces to a liberal dose of lubricating oil. The excess may be wiped off. In the steering mechanism every joint must be occasionally well oiled. Likewise the toggle joints to which the springs are fastened. The exposed driving chain should be occasionally cleaned, and this is best done by soaking it in kerosene or gasoline and then submerging it into melted tallow (beef fat). Even with this attention its life is none too long. Oil must be kept off the tires; they must be properly inflated and the rear ones given a rest by jacking up at night or when standing any considerable time.

PREFERS THE GASOLINE MOTOR.

I have perhaps already sufficiently shown my preference for the power I think most suitable for what appears the system of the greatest promise. And yet I should like to give in a little detail some of the reasons for my choice. Foremost and chief among these is simplicity. A clean fluid in a tank, a crank, a spark, and the rest is automatic. In driving there's "nothing to watch but the road," and this is literally true. Wide radius of action. Safety: As compared with steam there is much less danger of fire. Economy: Gallon for gallon and ton for ton the advantage is on the side of gasoline. There are disadvantages, but these exist in each

three systems. Chief among them soline are excessive weight and vi-n. I know of no others, and these ill rapidly be eliminated.

weak feature of the system is the nission—that which harnesses the to the carriage. The planetary sys-driving direct on full speed, saving rning of gears, looks simple, but is lly satisfactory, although an improve-on friction disks. The full speed requires rather frequent adjustment, nless it is just right it wears rapidly. ry an insect powder gun filled with ered resin, and once a day or as re-l blow a little between the metal sur-This is simple and easier than con-adjustment.

THE TRANSMISSION QUESTION.

carriage is equipped with two speeds rd—a third or intermediate would be at improvement. The slow speed affords an excellent brake by gently ging it on throwing out the clutch. saves the hub brakes for emergencies. planetary system of gears will be lacking. It has not come to stay. I the personal testimony of a dozen s who own and drive otherwise ex-t wagons, and they each and every admit clutch troubles with this type nsmission. The Panhard sliding pin-with all gears cut out on full speed, l perhaps solve troubles due to lack sitive, quick action. Something like is demanded until gasoline engines ne more flexible and reversible. With ility increased and reversibility an nplished fact the problem will be simple.

SOLID RUBBER TIRES.

h the great coincident lessening of the of dead weight and improved spring nsion will come solid rubber tires. indeed the automobilists' paradise be in sight. However, under present tions I should hardly care to give up natic tires, although they are about weakest feature in the entire proposi-Whether double tube or single, their ional behavior is one of the most ex-ating annoyances I have had. Great ht and great speed mean short life, the converse is equally true. Light ht, moderate speed, long life for tires or the machine, too.

DEFECTIVE PACKING.

ferring again to my last thousand , outside of tire troubles there were but those incident to defective pack-of the engine head. The water circu-n is forced by a chain driven pump, the little bicycle chain soon stretches of pitch and is with difficulty kept in . The consequent heating of the ne is hard on the packing and may an annoying leak into the ignition ber. Such a leak compelled me to t to a tow of 3 miles home. Few s could be more humiliating to a year automobilist than this. Next morning my boy and I were at our job before breakfast, and before the day was spent the carriage was again in operation. That pump has refused to work several times since, and one day the water froze in the radiator, and although the engine got so hot that compression failed and it stopped, the packing was not spoiled. The plain asbestos used by the manufacturers allows rather frequent leaks and causes much annoyance, and I therefore gladly mention Mobilien, which we used. It consists of finely woven copper wire running through asbestos, covered on one side with graphite, on the other with red lead. Accurately fitted, with holes for the studs carefully punched out, it promises to eliminate this source of trouble.

GEAR DRIVEN PUMPS.

Oil pumps and water pumps should have a positive or gear drive, and not such uncertain devices as belts or chains. Likewise the electric generators. In the absence of gear drive better depend on circulation by syphonage or on a good battery (caustic soda, copper oxide and zinc). The simpler the mechanism, the fewer the parts, the less likelihood there is of trouble.

LOWER COST OF OPERATION.

It may be worth while to name a few of the reasons why future driving will be less costly than was my own—less costly even to the beginner. The original cost is less; for $1,000 or under one can buy a better machine than the $1,200 one of two or three years ago. The prevailing type is lighter; this means great saving in the tire item alone. It requires less repairs, and moreover the repairmen are better trained, more prompt and less grasping. Although cost is a main consideration in deciding in favor of one or the other method of driving it is not the only one. Availability comes next. Conditions of city and country driving obviously differ. For all cities in this section no season offers insuperable obstacles to auto driving. To this there are rare exceptions.

LOST ONE WEEK IN THREE WINTERS.

During the three winters of my own experience there was but one week when use of the motor was out of the question. The high snow drifts in the narrow streets on each side of the car tracks allowed one no room to stand, even though one could progress between the rails. But then horses were equally at a disadvantage Cold or rain makes no difference; only too much snow can put our horseless carriage out of commission. During the other extreme, which we experience in the torrid days of July and August, our outtfi is obviously at an immense advantage. At this time it is often hazardous to drive a beast in the heat of midday.

Another feature: All of us have patients who call us only after hours when we are tired out, when our day's work ought to be done. Our horses likewise are tired and in the stable for the night. Here the peculiar utility of the new rig is obvious. Likewise in those sudden emergencies to which all are likely to be called at any moment, where the saving of a few minutes may mean the saving of a life. No time to hitch up the horse or wait for trolley, but the motor may be cranked and we may be off in an instant to render aid, not in breathless exhaustion, but in the pink of condition. Were I located in the most benighted section, cursed by the worst roads in this or any land, I should still own a motor and a horse—broken to the saddle. He would carry me through snow and mud under conditions which even a sulky could not negotiate. But in a locality like mine horse and buggy are superfluous luxuries.

WHAT KIND OF AUTOMOBILE SHALL I BUY?

What is the best, electric, steam or gasoline? If gasoline, whose; what make; single cylinder; horizontal opposed motor or vertical twin cylinders? On the basis of my own experience and as a result of observation of others I am compelled to admit none of those on the market at present completely fill the bill. This may be only my own opinion. Indifferent engines and makeshift transmissions are found on reachless running gears of ample wheel base and otherwise ideal construction; good, practical engines, on mean, cheap, stiff, impractical mountings; good engines coupled to bad carriages by transmissions bound to prove unsatisfactory and troublesome. But nowhere an ideal engine, coupled to a sensible carriage by a positive, good and lasting speed changing mechanism. I have recently undertaken a collective investigation, interviewing some ten men whose experience ranges from six months to as many years, and they invariably admit clutch troubles in connection with the system of planetary gears employed on their machines. Otherwise they are delighted; especially with the engine, a two cylinder, two cycle.

The desideratum is a light, powerful, double engine, a light, strong and correctly built vehicle, having automobile and not carriage lines and a reliable, positive and lasting speed changing mechanism. So long as we find it impossible to get this trinity of perfection it would be folly to recommend the auto built by X, Y or Z. Many of us will be inclined to hold on to what we have until we are assured of something better, but the rest—the army of new comers, young and old—need not hesitate. Any one of a dozen widely advertised machines will do at least as well as our earlier ones—perhaps better, and with determination and half the enthusiasm of us older men the tyro will surely find satisfaction, pleasure and some disappointment.

SPECIFICATIONS OF MY NEXT AUTOMOBILE.

Engine: A two cylinder, two cycle, developing from 4 to 8 horse power at a speed ranging from 800 to 1,600 revolutions per minute and so throttled that it can be operated practically all the time

without gear changes. Ultimately it will be reversible. A constant level (even going up hill), float feed carburetor.

Clutch: A self adjusting cone, working in a recess on the flywheel and positively operated by a spiral spring—all gears cut out on full speed, change of gears being through sliding pinions.

The wheel base shall be not less than 6 feet; motor in front and driving through a flexible shaft and bevel gears to a differential on a live rear axle, all encased in water and dust proof case with ample provision for holding lubricating oil.

Many little details should receive attention. All gears subjected to hard driving strain should be wrought, not cast; bolts subjected to hard wear, case hardened, likewise nuts that require frequent removing. Every possible mechanism that can be spared must be left off; circulation of water by syphonage rather than pump. Lastly, it must be capable of speeds ranging from 4 to 40 miles per hour. Let these demands not be considered immodest nor impractical.

I am sure the near future will give us even a better machine, perhaps more practical than I can foretell or demand after the trials experienced in my 15,000 miles. Finally, while the very best is necessarily the ideal of the future, I would undertake to select one of a dozen makes of automobile—even the poorest, crudest gasoline of two or three years ago—and do more with it than with two horses and as many carriages and at no greater cost for a limited time. And why for a limited time?

I have now driven my second carriage a little over 3,100 miles and a full account of its failings and successes would fill a volume. A partial list of the former will answer the question; for the latter let it suffice when I say I still think it one of the best of its type—a single cylinder, 5x7 horizontal engine, driving a medium weight runabout through planetary gears.

A BROKEN SHAFT.

On my second drive I invited a well known medical friend to take a ride. It was a beautiful, cool November day, but we did not get very far, for right in the middle of our main thoroughfare, just as all the churches were pouring out their throngs, the shaft in the change speed gear parted from the flywheel, leaving us standing still, while the engine kept up its regular puff. It was a case of tow, for the driving shaft had broken from its insufficient attachment. The mechanism which drove the clutch between the expanding dogs was not properly braced, so it soon became loose, and it was not possible to travel on anything but the slow speed, and this is very slow. This experience recurred some Sundays later, when I was giving another medical friend a ride—also a friend of the first. There was a good deal of fun at my expense when the two met.

A CLIMBING CHAIN.

Very soon after this the driving chain climbed the sprocket, broke three teeth out of it and bent the shaft of the change speed gear. The reason for the chain climbing did not appear until some months later. It was due to the direct attachment of the springs to the angle iron frame on which the body rests without the interposition of distance rods to hold the rear axle back. The driving chain is on one side. After the clutch had been properly fixed my repairman started up the engine, put the front wheels against a wall and slowly pulled in the clutch, thinking the engine would be stopped if the clutch did not slip. The unexpected occurred, neither the clutch slipped nor the engine stopped, but the spring buckled, threw off the chain and again bent the shaft. The absence of distance rods was clearly the reason why the chain jumped the sprocket and bent the shaft. It was a two days' job each time to take apart and reassemble that change speed gear and straighten the shaft. Distance rods were later added and that chain can never climb the sprocket again.

ANOTHER BROKEN SHAFT.

About this time I had a very strong inclination for a two cylinder engine, and after some advertising I sold my number two at a bargain to a brother physician sixty miles distant. The day for the drive to his home was fixed; he was to accompany me, but was taken severely sick, and I set out in company with my little boy one afternoon in July without the slightest suspicion that I should not reach the distant New Jersey town. The afternoon had worn along and 8 miles of good road still lay between us and our destination, when some serious internal break occurred. Investigation by the light of a lantern revealed a broken shaft, sheared right off partly within the journal and between the crank and flywheel. The bargain was off. The machine went to the factory by freight and remained there five weeks. I was told it was necessary to rebore the cylinder, and of course replace the broken shaft and fit new piston.

I must admit the machine came back in fine shape, and in spite of my earlier convicitions I gave up two cylinder motions. It would climb practically all hills without gear changing, and it ran very quietly, and, as I have said, 1,000 miles without trouble and only the most insignificant repairs.

AN OVALIZED CYLINDER.

In the next 100 miles signs of distress began, and while this paper was in process of preparation the most serious possible trouble has developed. After cleaning up the exhaust and grinding in the valve the compression was so poor that the engine could only be started after some graphite had been worked in between the piston and the cylinder walls. Removing the crank case we could hear the escape of gas past the piston. After a few more miles great friction occasionally occurred, so that cranking was difficult. On pulling the engine apart, the piston was drawn from the cylinder with difficulty; it was worn very unevenly, being polished on opposite sides; the connecting rod rubbed one side of the crank and the cylinder itself was nearly 1-16 inch greater in its perpendicular than its inside measurement. It had become ovalized, or elliptical, although its walls are perfectly smooth. The piston is out of line with the shaft. I am told new bearing for the shaft will be necessary and the cylinder must be rebored.

I here offer my apology to Mr. Haines, who recently gave an account of his experiences with a similar engine. No wonder it failed to pull the tonneau and four

A Duryea Ready for a Wet Day's Work.

people, and finally could not be started. Had I continued to operate mine a little longer it might have suffered a broken shaft again.

LIFE OF AN AUTO.

I am reliably informed that no horse will stand a daily drive of 20 miles longer than two years—a total of 14,000 miles; that he will then be worn out. My first carriage, but for manifest crudities and imperfections, could have done much more, in fact did nearly as much. I am sure the experience of many others will be more favorable than mine, also that my future driving will be more cheap and subject to fewer interruptions because of things which should not be and which are clearly avoidable. The horse has many limitations, and in the future, if not in the present, he will surely be distanced by the auto. In a word, auto driving is as superior to horse driving as the incandescent light is to the tallow candle—auto driving when all goes well!

Its life will be measured by hundreds of thousands rather than tens of thousands of miles. I am sure the automobile in the near future will be as necessary a part of the doctor's outfit as the clinical thermometer, the hypodermic syringe, the stethoscope or the obstetric forceps. It will eliminate the drudgery of going from place to place and from patient to patient; it will promote the doctor's happiness, lengthen his days and enhance his usefulness to his community.

Six Thousand Miles in a Physician's Automobile.

By Dr. Frederick Krauss.

The numerous inquiries of my friends regarding the use of the automobile in the practice of medicine have prompted me to record my experience, and my deductions therefrom.

In July, 1901, I bought a gasoline machine, which had been built about seven months previously and had been run at intervals up to the time of purchase. It had just been overhauled in the factory at a cost of about $90 and was therefore considered to be in a first-class condition.

A SECOND HAND MACHINE.

I bought a second hand machine by preference, because I was very ignorant of the anatomy and physiology of the beast and expected to meet with mishaps while learning. My expectations in this direction were fully realized, and I had a number of opportunities for gazing into the abdomen of the carriage, deeply puzzled to know what was the matter. But, finally, I learned the construction so thoroughly that I had no hesitancy in taking the whole machine apart in all its details and reconstructing it—with some improvements.

Until within a few weeks I was never compelled to ask for a "tow" home, but had this experience on two occasions within ten days, on account of the breaking of a gear wheel operating the exhaust valves.

A Philadelphia Doctor Ready For His Morning Round.

REPAIRS.

When I first began to operate the machine it was necessary for me to have all repairs made by the repair man, and usually much time was lost, during which I could not use the machine. In the last ten months all repairs, except the last, of which I will speak later, were made in my stable by my chauffeur and myself with very little loss of time, comparatively.

WHEN EVERYTHING GOES RIGHT

the pleasure and enthusiasm generated by the automobile are unsurpassed. The exhilaration almost amounts to intoxication, and nothing could persuade the owner to part with the machine. Rapid time is made and the great distances of a scattered practice almost annihilated. The exercise of the muscles, part of which at times may be very involuntary, is beneficial to the general health, as is also the fresh air and sunshine with which one is surrounded. I have a removable top on my carriage, and always ride without it if the weather permits. I am stronger physically than I have ever been, on this account, I believe.

The points, then, in favor of the automobiles are as follows: (1) Easy and rapid locomotion; 10 to 12 miles an hour is a very safe pace when the operator is experienced and possesses what should be an absolute requirement—namely, a cool head and a quick mental reaction. (2) It is ready for instant use at any hour. The turn of a crank is almost all that is needed. (3) The pleasure of an unobstructed view and the exhilaration of the movement is unequaled. It affords a relaxation from the many little worries and mental strains that seem to accompany the physician's life. (4) The physical exercise required, even in merely running the machine, is beneficial, as is the slight tremor of the machine, due to the explosion engine. This tremor is at first a source of undue excitement, as I found that in the beginning it gave me a sense of being forever in a desperate hurry and imparted a marked tremor to my arms and legs, which persisted for some time after leaving the carriage. This is no longer the case. (5) A broader knowledge of practical mechanism is acquired, which cannot fail to be of general value.

THE DISADVANTAGES

of the automobile are also many and potent. Firstly, it is not absolutely reliable. By this I mean that there are many adjustments on automobiles that must be accurately fixed and kept so. These adjustments are usually easily made on the road, but take time and make dirty fingers and clothes. Days may elapse and a hundred miles or more traversed without any required adjustments or other trouble, and then one thing will follow another, so closely that the operator is disgusted to repletion. Secondly, it is much more expensive to operate than one horse and carriage, in addition to its greater first cost.

FIGURES OF COST.

Many figures have been given by various operators, showing excessively great or excessively small operating expense. These figures are largely based upon the desire of the automobilist, as the figures can be made small or large by the method of bookkeeping. However, unless a man has the time and knowledge to make his own repairs, the item of operating cost will be large if he runs the machine over six or eight months. After my carriage was eight months out of the factory, the man-

agement of the manufacturers of my machine told me repeatedly that the machine would have to be rebuilt at great expense, as it was worn out and out of date. This, however, was a gross exaggeration, as the machine was overhauled by myself and man, all the worn parts, keys, &c., replaced at comparatively little expense, and the machine is now better than a new one. Thirdly, the automobile is still a new thing, and is greatly in vogue by rich sportsmen, who care nothing for expense. It is, therefore, quite natural that the manufacturers are catering to this class of trade and disregarding the voice of the business or professional man. They are rushed with orders beyond the capacity of their factories, and appear to be regardless of the future. It is simply a matter of time before this order of things will be changed.

REPAIR MEN.

Because of the newness of the automobile business, the number of reliable and honest repair men is exceedingly small. By some, indeed, he is considered non-existent. It was thus in the matter of bicycles some thirteen years ago. I frequently paid half a dollar at that time for renewing one spoke of the safety wheel, comparatively new at that time. Repair men are always at a loss to know how they can increase their charges and still remain within the pale of the law.

IN THE HANDS OF THE PHILISTINE.

An experience of mine will illustrate this. An important gear wheel operating the exhaust valve broke on my machine, stopping progress beyond all hope of immediate relief. I foolishly but innocently telephoned to the repair man to assist my man to tow the machine to his place of business—less than 3 miles away, but over a level asphalt street. My chauffeur, who has become quite expert with my carriage, made the repair, assisted to a slight extent by an employee, who proved himself singularly inefficient, breaking almost everything he touched, and, further, tried to corrupt my man.

I received a bill shortly after for fifteen hours' time at 50 cents per hour, in addition to the charge of $2 for the tow of the automobile and extra charges for the broken parts.

In answer to a gentlemanly request for an itemized account of the time consumed, I received the following postal card:

"I find the actual time we put on your wagon was over eighteen hours. It was not merely the taking apart and putting together, as the new frame, etc., had to be fitted. We have made no charge for the time giving advice, etc., to man before you ordered us to do work on the job, nor for the several days you monopolized the valuable room in our shop, which we needed at that time in the work on other wagons."

Upon investigation I found that my man and a relation of mine had done nearly all the work, and the time charged against me must have been put upon some other machine. Upon the presentation of very convincing proof the repair man kindly accepted $5 for the advice given, the valuable room monopolized (my carriage is of the small buggy type) for several days and the work done on the machine. I believe this gentleman to be honest, but simply mistaken in business policy. He is following the pace of others who have preceded him, but from what I hear users of automobiles are getting wise and avoiding those that follow this practice.

But enough of this dark side.

In spite of its inherent faults and the vulturous nature of the repair departments, the automobile is destined to grow enormously in popularity. It is the source of the keenest pleasure possible to imagine. The motor motes us over many miles at a goodly speed without tiring, always willing to go as far as we desire. We fill our lungs with fresh country air impregnated with the odor of the pines and feel that life is truly worth living. We feel at peace with all the world, even with the repair man. Under no circumstances would we part with the virile, breathing, puffing machine to which we have become attached.

THE OTHER SIDE OF THE PICTURE.

Sometimes, however, a succession of accidents, usually all the same day, produce the most completely disgusted individual possible to imagine, especially when that individual is, or imagines that he is, in a great hurry. I have a record of six successive punctures affecting two tires (inner tubes) in one day.

It was a hot summer day, beautiful traveling for about 5 or 6 miles, when the inner tube suddenly exploded with a great noise. A repair was made and 3 more miles covered when the valve stem broke off. After another repair another 1½ miles was covered quickly, when the valve stem broke again. I then took the train for my destination, sending my man for the extra inner tube that he forgot to bring from home. He had almost finished the repair, when, after inflation, the new tire flew up, causing a long tear, the tire having been pinched by the outer shoe. A repair was made that lasted to the location of the first mishap, when an old patch became loose. This was repaired, but 2 miles farther on we met an obstreperous nail; we did not notice the deflated tire in time, as we were going at a lively pace, and the valve stem was torn off. After this repair our chapter of accidents was closed for this day, which had promised us so much pleasure.

Several months sometimes elapse without a puncture or other tire trouble. I cover many miles with my machine that I could not possibly cover with a horse in the limited time often allowed. It is a source of pleasure and recreation, and, barring occasional accidents, is the physician's ideal mode of locomotion. For a scattered practice it cannot be excelled, but for work concentrated in a narrow radius the horse is the surer.

MILEAGE COST.

In sixteen months I have covered, approximately, between 6,000 and 6,500 miles. In the last month I have averaged 30 miles per day, some days covering 50 miles. Some few personal experiences may be interesting. I have been using the automobile for the past sixteen months. The cost for the first year was $800 and the whole sixteen months $984 approximately. This cost includes my man's wages, but makes no allowance for interest, storage, etc., nor for a number of parts and repairs made for me by interested relatives, nor for my own time and thought; the latter belong to the pleasure element.

The expense is thus seen to be somewhat above that of the horse, say about 15 cents per mile.

The repairs made and not charged for are putting in new and heavier sleeve for the live rear axle, an extensive and tedious job of unbrazing and brazing shoulders, differential gear case, etc. The sleeve removed was thin brazed tubing, and this on a so called highest grade of machine! The manufacturers stated that they "had long since relieved themselves of responsibility." The front axle was accidentally bent and had to be straightened. New gear wheels, clutch (complete), clutch dogs and other parts were charged up at cost of raw material.

Repairs made by my man are charged only in the way of salary. On the other hand, my first year's expenses would have been much reduced if I had then known as much about automobile construction as I have since learned. And for the encouragement of others I wish to say that sixteen months ago I knew as near nothing about automobile construction as it is possible for an educated non-mechanic to know; but a little bitter experience and great determination to conquer will enable anybody to contend successfully with any good automobile. Rarely, then, indeed will any "bucking" of the automobile confuse the owner.

EXTRA PARTS CARRIED.

I always carry extra chain, belt for water pump, wire for electric connections, extra spark plugs, tires, etc., and a complete repair outfit. These extras take up little room and are a godsend when anything does happen, as it occasionally will.

A comparison of horse locomotion and automobiling cannot be made with any degree of fairness. They are essentially as different as the canal boat and the limited express train. The canal boat requires less attention, less scientific or skilled labor, and is less expensive, but given time enough it will accomplish the same amount of work. But when time is valuable the expense alone cannot be considered.

Time is saved and much pleasure obtains to the user of the automobile. The

present time is higher, but I :ve that in the near future the ill be much less. Duplicate be made according to a stand- ot in stock, so that replacements natter of ease to everyone ca- ing a wrench and screw driver.

TIRES.

test item of cost (excepting the or of the repair man) is un- the cost of tires.
ising clincher tires, and find easy to repair, yet, nevertheless, reeable on the road. I have o sets of tires, the first of which : old pattern and defective. The have given me much better sat-

had to complain very strongly ather more than was pleasant to ery obvious and admittedly de- style shoes, sold to me as a late placed without cost, which the ers did eventually.

EARLY EXPERIENCES.

of my early experiences may terest. After a few hours' prac- ame familiar with the starting, nd stopping of the machine. I uurageous, and two days later ting relative for a country ride. beautiful but hot day in July. running made the air seem cool, miles were covered before we turned about to return home. engine suddenly stopped. I crank with great vigor and ersistence, but without result. was thoroughly tired I walked e and telephoned for assistance. ntime a thunder shower had sud- en, and, while it rained, thun- l lightened, my friend and I friendly shelter of the porch of house and ruminated upon the of the horse vehicle. The ar- he expert, followed by the re- a small piece of rubber which d the needle valve of the carbu- us in a position to get home vhich we certainly did. There- oride and confidence were some- ced. Shortly after this, upon ap- a railroad crossing at the base hat I was descending, I attempt- the carriage as an express train lly approaching. To my con- in spite of the application of my carriage kept moving. mbered, when but a few feet passing train, that in such a dif- could turn off the spark switch, arriage stopped none too soon. tch plates had somehow become and could not be released. I to start the machine on the low umped into the carriage while it g and so managed to get home. times I have had to search for a weak and inefficient spark, and l a place where the insulation of a connecting wire had become worn by the too pointed iron tack used to hold it in place. Such wiring may be good enough for manufacturers, but it gives no end of trouble to the users.

SKILLED DRIVER NEEDED.

In conclusion, I wish to remark that, in my opinion, it is necessary for the busy practitioner to have with him at all times a man who is competent to run the machine and make all such repairs and adjustments as are necessary on the road. Otherwise soiled fingers will be common at times. In cases where some time will be consumed in the repair, say, of a punctured tire, I go to the next call or visiting place and have my man follow me. Thus I lose no time.

I also wish to state that unless the user will study his machine and know the construction and use of every part, he will be in trouble nearly all the time and will finally give the automobile up for a hard job—and eternally swear by horses for the rest of his life.

4,500 Miles in a Pennsylvania Doctor's Practice.

By Dr. Charles H. Schoff.

Nearly two years ago I purchased a gasoline car weighing about 1,000 pounds, with a two cylinder horizontal engine under the body of the carriage, sliding gear transmission, two speeds and reverse, circulating pump run by a belt, water and battery box in rear and gasoline tank in front, and said to have 8½ horse power. I had a great deal of trouble at first, mainly because I did not know how to adjust my spark device, although I was always able to get home with my own power. I spent a good many hours on the road working over little things connected with the sparking device which would now not take me a half minute to remedy.

After having become acquainted with these details, which I should have known before I tried to run a machine, and which took me about two weeks to learn, I thought I was ready to have some fun out of the machine, as well as to use it in my practice. But about eighteen days after I purchased the machine I broke a front spring, which resulted in my sending it back to the factory, 12 miles distant, to have a new spring put on, and to be without it for two days. I had it home again only about four days when I broke another spring. A week later I broke a shifting rod in my gear case and two weeks later, while at the factory for some minor trouble, the manager suggested that if I could leave the car he would have a new axle put in for me, because some of the cars of the type I had purchased they had found contained poor steel in the rear axle, and they wished to correct this before any accident might occur. I agreed that this was wise, and left my car for another week. My work was particularly heavy at that time, requiring the use of three horses, and having sold one I was compelled to call on the livery stable, besides having to answer a hundred questions a day as to the trouble with my automobile.

REACHES BREAK.

After this I managed to run pretty regularly for about a month. I don't believe, though, that there was a day that it was not necessary for me to spend a half hour on it before we could get started in proper shape. I then broke one reach, while going out in the country over a very rough road, but this did not cause me any trouble and we managed to get home, a distance of about 6 miles. I did not have any further trouble until about a month and a half later, when I broke another reach, while running down a very steep and rough hill. During these intervals I was having a fine time, although compelled to use some of the worst roads I know of and to daily negotiate hills with from 18 to 20 per cent. grades. Previous to the purchase of my machine I had been using three and sometimes four horses, but after two months I reduced to one-horse during the summer, and after Christmas, when the roads became muddy, I began to use two horses with my machine. I ran my machine last winter up to about the middle of February, using it on ice covered roads and during heavy snow storms, when I was compelled to wrap the rear wheels with wire rope to keep them from slipping. I was away from home the worst part of the winter after this, and on my return I had a hood put on and did not get a chance to use it until April.

A HILL TEST.

The first day that I used it after this two months' lay up was one afternoon when I heard that four or five machines were coming out to my neighborhood to try a certain steep hill, and, of course, I wanted to see this performance and try it myself. So I went to the carriage factory and took the machine out, spending less than five minutes getting ready, and with the top half finished, and very easily held my own against five machines of different makes.

LOSS OF POWER.

After the hood was finished I used the vehicle almost daily for about a month and a half, when it began to lose power; I then decided to have new bushings put in and give it general overhauling. This cost me $22, which was the first money I spent on the machine, although I had owned it ten and a half months, from July 1 to May 15. The company gave a guarantee for a year, and, of course, made good the breakage of spring, etc., a most fortunate thing for me, as I fear I would have gone out of the business had I been compelled to spend so much so soon after purchasing the machine. When it was returned to me I soon realized that it still did not have the power it ought to have, but as I was very busy I did not have time to find out the cause, and continued to use it almost daily with varying amount of power, sometimes as powerful as ever, and at other times not

able to negotiate the slightest hills on high speed.

I then began to realize that for a doctor a machine should be of sufficient power to be able to run fairly well, even though it is not in perfect order. A physician who has to go out morning, afternoon and evening wants a machine that will get there even though not exactly in perfect running order, or else he has to keep two machines or one machine and two horses. I ran on, however, from about the middle of May until August 10, when I had what might have been a serious accident. You will notice that the interval between my troubles begin to be greater as my knowledge of the gasoline engine increases.

Well, on August 10, as I was coming down a slight grade of a long driveway to a country residence, we turned the corner of a road in the woods, suddenly finding ourselves within ten yards of a carriage containing a lady and child. My man was driving at the time, and he says he put on the brake, but as it did not work quick enough he pulled the lever and ran into a little stone wall at the edge of the road, which upset the machine, completely turning it over within two yards of the horse, pitching us both out without damage to either. The horse, fortunately, was not frightened sufficiently to upset the carriage. It took seven men to put the machine on its wheels again, but it started on the first turn and we ran home with only the hood broken. I mention this to show how much an automobile will stand and how careful one should be in turning corners so fast. It is hardly necessary to add that I am pretty careful on that driveway nowadays.

REAR AXLE BEARINGS WORN.

One month after this, while going up a steep hill, I noticed a grinding noise in my rear axle. So I took it off to investigate and found that the bushings in the axle were worn, which had resulted in breaking a couple of teeth out of the differential. I sent for a new gear and new bushings, and proceeded to put them in myself. Although I thought I had my machine down fine by this time (over a year after purchasing it), I now realized that there was quite a little yet to learn, although I succeeded, with the help of my man, in putting the axles together very nicely.

About two weeks after this the belt running my circulating pump broke, after nearly a year's use, and delayed me on the road quite a long time. This same thing occurred again within a week, but that time I was only a square's distance from my house; it has not occurred again since.

Within two weeks I was again delayed on the road with the spokes of one rear wheel becoming loose to such an extent as to allow the shoe on the tire to come off. I think this caused my longest delay on the road since I owned the car. I managed to repair it on the road by putting in some new spokes and a few washers on the others, with the result that it has never been touched since. I used the machine daily in my practice, notwithstanding the trouble I had from time to time, until November 17, when I decided to put in a new set of transmission gears, although at the time everything was doing well. I had ground my gear badly when I first got the machine, but did not care to be without it; besides I had then no evidence that the gears were not able to do the work. I ordered the gears from the factory and proceeded to put them in with the assistance of a competent machinist. After the experience with the bushings in the rear axle I had come to the conclusion that it was best for a man owning an automobile to have all repairs done in his own shop as far as possible. I remembered my early experience of sending the machine to the factory and never discovering the cause of my trouble. Anyway, we succeeded in putting in the gears perfectly, but we could not get the machine to run with any power. So I decided to send it to the factory, much against the wishes of my man, who wanted to work out the trouble and remedy it himself. You see, we had plenty of trouble, but for seven months we were never compelled to go to the repair shop for assistance.

REPLACING WORN PARTS.

At the factory they succeeded in putting the machine in perfect order and getting as much power as when I first purchased it, but they put in two new inlet valves, new bushings in the crank case and on the two-to-one shaft, a new chain and two new sprockets. It is hardly necessary for me to tell you what I thought of my previous knowledge of the machine. The continual working on the machine and my using it almost daily in my practice through rain and snow has placed me in the position of having a pretty fair knowledge of how to care for a gasoline automobile, but only after nearly two years' study. I have been running two or three days a week since my last repair without a single miss of any kind, and I believe my car is as good as when I first purchased it.

I cannot tell what distance I have covered, but I have used seven gallons of gasoline a week for twelve months in all. I have the gasoline delivered every week, seven gallons each time, and I can cover about 100 miles on the seven gallons, so that I have run about 4,500 miles.

WHEELS AND TIRES.

I have wire wheels, and with the one exception I have had very little or no trouble with them so far. The question of tires is a most important one. I have used nothing but double tube tires. I have worn out five tires completely and have four good tires on the car, which have been in use about four months. I expect these to last six months more at least. I believe that with a car weighing under 1,000 pounds you can count on nearly or fully a year's use.

You will notice that I have given merely an outline of my troubles and have not mentioned the pleasures I have had out of running my car, but I have had more pleasure in making my rounds than I ever had before, and it won't be long before I will have another car on lines I think particularly suitable for a physician's practice.

I cannot state exactly what my expenses have been, because most of the repairs were covered by the guarantee of the company, but I know you must pay to learn how to run an automobile. After you learn thoroughly I believe the expense is not great. I am sure you would never be without a machine after you experience the pleasures of running one.

Simplicity Not the Only Desideratum—Good Workmanship.

By W. F. MacLennan, M. D.

My experience with the automobile dates back about three years. I caught the fever some time before that, but there was nothing in automobiles in my section but the light steam carriage, and I was afraid of the boiler from a little previous experience I had with that motive power, so finally I started to build a light gasoline carriage, partly of my own design. I spent some time on it, owing to the fact that I had to decide just what I wanted, and then had to hunt some one to make that particular part. In a number of cases it would prove to be what he thought was best and not what I wanted. After about a year of trouble of that kind, in which I got most of my running gear and the engine built, I finally became disgusted and putting it aside I secured a heavy gasoline carriage second hand. It had a double cylinder engine and weighed about 2,000 pounds. This, coupled with the fact that there was no relief to the compression, made it very warm exercise on a hot day to crank the engine for a half hour to get it started, a fact that always led me to dread stopping the engine at any time, as it had a bad habit of running away from the stable, but not wanting to come back when stopped. After four or five months of turning the crank and perspiring, I concluded to purchase a single cylinder machine of the runabout class, which were not very numerous at that time. After looking around for a time I finally selected a light 5 horse power runabout, made nearby, for two reasons; one was the moderate price and the other that it seemed very simple in construction.

SIMPLICITY AT A SACRIFICE.

Simplicity in construction is a good point, but I was soon convinced that it could be carried too far in automobile building. The carriage weighed about 600 pounds, and had a 5x5 inch engine mounted on the frame of tubing. The engine was not balanced, and had no throttle or

COASTING DOWN HILL IN A LIGHT STEAMER.

RAMBLER GASOLINE.

PIERCE MOTORETTE—GASOLINE.

PACKARD GASOLINE.

U. S. LONG DISTANCE GASOLINE.

ELMORE GASOLINE.

YORK, PENNSYLVANIA AND NEW JERSEY DOCTORS USING AUTOMOBILES IN THEIR PRACTICE.

spark advancer, and consequently no way of regulating the engine speed, which was supposed to be constant. On the high speed gear the carriage rode fairly comfortable, but when owing to breaking one of the chains I had to ride 5 miles on the low gear, the vibration of the carriage was something fearful, and I will always remember that ride. I began to experience things the first afternoon on receiving the carriage from the factory. They had striven to make the carriage so simple that they had not put any more work on it than they could possibly help. I was going along at about a 15 mile an hour clip when suddenly the carriage seemed to take the bit into its mouth, as it were, and started directly for the curb, in spite of my efforts to keep it straight.

We went over the curb and down a bank. After stopping I discovered that the steering pillar worked on a pivot, and there was no means of keeping it on, and a slight pull on the steering lever would cause it to jump off and let the carriage run wild. After a little trouble I got it up the bank and started for home, but before reaching there I attempted to throw off the cone clutch and found that I could not release it, as the lever was not heavy enough and had too much play at the bolted end. When nearly in front of the house I threw off the switch, with the intention of stopping the carriage by the stoppage of the engine, but owing to the cylinder head being very hot self ignition took place, and the carriage kept on running. I then thought of the brake, but that had been built with the same endeavor to secure simplicity, being but a small band of hoop iron around a small cast iron drum. It might have kept the carriage from running up hill, but was not powerful enough to act on the level. In my endeavor to apply the brake so as to take hold the steering pillar came off again, and I started for the curb, but not hitting it fairly did not go onto the sidewalk, but turned and started square for the opposite curb and house. I went over the curb with a surprising show of power, and struck an iron fence, and was wedged between it and a large tree. I then concluded that I had had enough experience for one day, and had the carriage pushed home, and looking it over found that the damage was only two badly bent axles, though the rims of the wheels also had suffered. On looking over the frail construction I was surprised that there was no general wreck, as it seemed to be made of ordinary bicycle tubing and lugs which had to bear the pounding of the unbalanced engine.

I RESTED FOR A FEW DAYS

and then invited a friend to take a trip out in the country. We made the run out fairly successfully, but found it required two persons to run the machine on country roads, one to steer with both hands and the other to work the clutches, which had to be held on. There was so much play in the steering gear that it required constant watchfulness on the cut up roads to prevent being turned over. We did not find it much of a hill climber, but it was an excellent coaster, and the first steep hill we struck kept us busy. The brake would not hold and the machine shot down at a lively gait, with the front wheels wobbling from side to side, for I was unable to keep them straight. The steering knuckles were made from an ordinary axle with a piece of pipe screwed in at right angles, and not screwed up tight at that. After going down that hill I concluded we had gone far enough and longed to get back to the smooth macadam roads again, where there was less liability to overturn.

DISPOSED OF HORSE.

I had disposed of my horse now, as I intended to get on by the use of the automobile entirely, after correcting the bad workmanship as much as possible, but as a precaution I also purchased a bicycle, and with the aid of it managed to make my calls, using the auto when it was in running order and the bicycle when it was laid up for repairs. I kept a local machinist fairly busy keeping it in running order. Around the town it did fairly well, as we have good macadam roads and no hills, but a trip out in the country meant a visit to the machinist. About this time, July, 1901, a light 4½ horse power, quiet running runabout was being placed on the market, and after investigation I sent an order for a 1902 model. I continued to use my light runabout, but was always finding something giving out, owing to poor workmanship, and concluded that the only thing to do was to rebuild the machine or sell it, and I finally accepted the offer of a party who wanted a gasoline carriage for experimental purposes. Including the loss on the selling price it cost me 60 cents a mile to run it. The design was not as bad as the workmanship, and had it been fairly well built, as any machine should be, it would have given good service for my work about town.

NEW CARRIAGE ARRIVES.

In the spring of 1902 my new carriage arrived after a great deal of letter writing to hurry shipment. After looking it over I was very much pleased with it. It seemed light but strong, and the workmanship was first class and gave promise of good results. It was a single cylinder, 4½ horse power, 900 pound machine, with long side spring suspension.

IGNITION TROUBLES.

I had trouble the first short run, owing to the porcelain of the spark plug breaking and dropping in the cylinder, and pieces getting under the exhaust valve and keeping it open. I also found the batteries sent with the carriage exhausted before I had 10 miles running out of them. My former two carriages had the make and break spark, and I found it very difficult to get good service with the dry batteries with that form of spark after very short use of the dry cells. The new carriage had the jump spark which in my case gave much better satisfaction than the make and break, which may have been due to the faulty design of my former carriage. I now found I had an ideal carriage for physician's use. It was light, neat and very easily controlled, and started from the seat. With top and storm apron I could go out in all kinds of weather, and it was always ready to go. By keeping my batteries renewed I was as sure to get out in the morning as with a horse, and it never tired or overheated. During the noon office hours I leave it standing in front of my house, and in case of an emergency call can get away at once.

I have had very little trouble with frightened horses, never causing a runaway.

I average about 200 miles a month with the carriage, and, as I handle it carefully, did not have to put a cent on it for repairs for the first 1,000 miles, and it looks as though it would run 3,000 as easily owing to the fact that it runs on perfect roads and is handled carefully. It has averaged me 3 cents a mile, including the cost of oil, gasoline and batteries, with an occasional

SPARK PLUG,

in the use of which I seemed to be unfortunate in the beginning, not being able to get a perfect plug. Now my plugs give me very little trouble, as I use a patented porcelain plug, which needs little attention. I found the mica plugs very good, but they require a great deal of looking after as a slight deposit of soot on them, due to too much cylinder oil or gasoline, soon short circuits. I always carry a mica plug with me, because I am certain to get home with it, for it cannot fail me so much as to refuse to run the engine at all, which is the case with a cracked porcelain plug.

A THIRD PURCHASE.

In September, 1902, owing to the favorable comments on its running in the Chicago 100 mile run, I purchased another runabout with the same size engine, but weighing 300 pounds more. The workmanship on this carriage is good, but in their hurry to put them out the manufacturers have neglected the assembling, and the clutches and sparking apparatus have given me considerable trouble. I have run it mostly every day since then in my practice, but it has not been so free from trouble as the lighter runabout, principally due I think to haste in assembling. The cost of running it has been higher than the other machine, averaging 5 cents a mile, and would have been much higher had I to pay for the tearing apart of the machine twice to correct adjustments that a couple of hours' work at the factory would have saved me as many days' work and the laying up of the machine a week. I am firmly con-

the automobile is the best means
ce for physician's use, especial-
e roads are at all fair, and that
it weighing from 900 to 1,000
le best all around carriage. For
n the country it might be well
1,200 to 1,400 pound carriage
nch engine. I am not in favor
low powered machine making
es per hour, geared to which
a better all around hill climber
ster machine and will require
g of the clutches on a moderate-
ntry. While the machine of to-
et perfect, it is such a big im-
ver those of a couple of years
shall never go back to the use
again. I feel far safer than
se and get around just as well
tomobile as I ever did with
ere my auto is now laid up
pairs my horses used to be in
wing to lameness. The slight
have had with this year's
but trifles compared with the
n the old models, as only those
d sad experience with the old
know. I have had no tire
e I think to the light weight
hree machines. At the end of
ny tires on the runabouts show
ns of wear. For a physician's
osed front would be a great
for stormy weather or in
one that would be easily re-
g preferred. I find the storm
esome where one is constantly
nd out of the carriage on a
n time it is reasonable to sup-
the machinery of my carriage
have more trouble and expense
running, but careful usage
ce the wear to a minimum.
more reason for an auto wear-
year's use, if properly built,
achinery, some of which con-
e good service for five or six
ger.

tion and Care of a Steam Carriage.

HN A. HAWKINS, M. D.

doctor finds that his business
the extent that he is unable
ork without the assistance of
notive power than his legs he
of the horse, and its accom-
buggy. This, of course, is
tradition, but mainly to the
horse has proven quite satis-
es past. So also did the stage
the inter-urban messenger.
t have the steam and electric
the telephone. In cities the
ill not always take one near
on, and with the physician
rom the car line are what are
avoided.
is an expensive method of lo-
this age. In the first place it
will only do a certain amount of work. It will get sick or hurt and requires more attention then than when well. If the weather is such that you do not wish to drive, you must feed and tend the horse just the same as if he were working. Unless you wish to keep a hostler you always smell like a stable hand. Your horse must be shod every three or four weeks. Harness and rigs must be kept up. Dirt from the stable must be hauled away, and at last your horse takes sick; you call a horse doctor; he looks wise, says horse has the colic, he dies (the horse) and you have to pay to have him hauled away.

You, no doubt, have for some time been thinking of an automobile, and now give it grave consideration. The question uppermost in your mind is what kind to buy. You have noticed the beautiful big red machine, with its finely polished brass front and lamps; make inquiry and find that they cost from $2,500 to $5,000 and even more, and require a mechanician at $100 a month to look after them. You see the little machine that runs along at 10 miles an hour making as much noise as though it were running 50 miles an hour, and shaking the occupants as though it had chills. Then you see the steam machine running along smoothly and without much effort but with a trail of steam behind. And finally you see the beautiful electric machine which passes you with its whirr, leaving no odor, no smoke, no steam and no noise.

THE FIRST QUESTION.

Now which shall I buy? That same question has been up to all of us. A gentleman who has had experience with all kinds of machines, covering a period of three years, expressed himself in this manner: "A woman can run an electric machine, a man can run a steam machine, but no one can run a gasoline machine." Of course, this is putting it very hard. There is very little to get out of order with an electric machine except the batteries. That problem was supposed to have been solved more than a year ago, but the battery question is just at the same spot it was many years ago. To get any kind of satisfaction out of the electric machine you must haul around with you from a quarter to a half a ton of storage batteries. In cities where there are storage stations one can have his electric machine cleaned and kept charged for little more than the keep of a horse. This, of course, does not include repairs or renewing batteries. Where expense is no object the electric machine is the choice. The gasoline machine, provided it is a reliable make and first class in every particular, is all right—when it runs. When it stops running its owner never knows when it will be running again. A balky horse is not in the same class with it. The operator must not only be an experienced machinist, but a gas engine expert as well. If he possesses all these attributes, then the doctor need feel no anxiety when he purchases a gas machine. He equips himself with the necessary tools and a suit of overalls and he is ready to visit his patients. But for all around use there is no machine that will give the doctor the same degree of satisfaction, considering price, expense and trouble, as the steam carriage. Any good machinist can repair it. As to which make is the best, that is for the agent to say; but I can safely say that almost any of them will take you to the top of any hill that a horse will, and in less time; will do more work than any three horses and cost no more. and when thoroughly understood, less than one horse. In considering the expense of running an automobile, as compared with the horse, one must not put them on the same level, as with an automobile you can do more work than with three horses, and then not feel that you must fight shy of the humane society.

IN SELECTING A STEAM MACHINE

decide first on what you want and then pay the price. Should you have a friend who is thoroughly conversant with the style of machine you have decided to buy, have him go with you to buy it. It is much better to pay a higher price for a machine made by an old, reliable firm. You are taking your life in your hands every time you start down a hill with an automobile and to have your brake give out, a steering knuckle break or a wheel collapse means more than the outlay of a few dollars at the beginning. A 14x14 inch boiler is small enough for a machine weighing, net, 700 pounds. A tank holding 20 gallons of water weighs, filled, 160 pounds. Two average sized adults weigh 300 pounds, which, together with gasoline, tools, etc., will make a load of 1,200 pounds. With this size of boiler a pair of 2½x3½ engines, which are usually furnished with the smaller sized carriages, will develop about 3.6 horse power with the steam pressure usually carried. Therefore, do not buy a heavier machine with a 14 inch boiler. The boiler should be provided with a feed water heater. See that the machine has an automatic air pump, as you will get a much hotter fire with less consumption of gasoline with 55 pounds of air than with less. Your engine should have an automatic pump on the engine which will pump a given quantity of oil into the cylinders in a given time. Oil is cheap, but cut cylinders are expensive. There is no lubricator made that can be relied upon on an automobile, as the parts are so small that they quickly clog up. I have had 25 per cent. greater efficiency out of my machine since I put a Manzel oil pump on my engine and my chances for a seat in heaven are better than when I tried to use a sight feed lubricator.

An all steel burner is desirable and a "generator" and pilot light are indispensable. If you have a fire tube boiler it should be provided with a fusible plug to prevent scorching the boiler. A low water alarm is probably a good thing on level

roads, but I am not yet satisfied as to its value on hilly and undulating roads, owing to the constant shifting of the water level in the boiler, thereby producing an almost continuous tooting of the little whistle. Gauge cocks are now provided on all up to date fire tube boilers. Ball bearing engines require more attention than those with plain bronze bearings, although each kind has its champions. The maker of an engine with "plug" pistons is in the same class as the man who sells you a filled watchcase for a solid gold one. Be sure that your engine has ringed pistons. An auxiliary steam water pump is convenient at times, but a hand pump is absolutely essential. Provision should be made on your water supply tank to drain it without tearing the connections apart. All steam automobiles should be provided with auxiliary throttle valves, as I have yet to find the driver who is satisfied with his throttle valve. I have reground my throttle and had it leaking again in three days, and this is the experience of others. I am putting a balanced Acme safety throttle on my machine at the present time and expect more of it. It is made heavy and the principle is good. I have tried it on a steam pipe and find it an ideal throttle in every way. I shall be pleased to let the readers of THE HORSELESS AGE know more of it just as soon as I can get it fitted to my carriage.

The makers are so sure it will work that they offered to return my money if I found it unsatisfactory after sixty days' trial. Three days are sufficient to prove the old style a failure, and the Acme costs very little more.

When the gasoline is forced from the tank by the air pressure it passes up through the boiler, across the top and down through the other side of the boiler to the burner. In its passage up through the boiler it is held back and broken up fine by a bundle of tightly rolled copper gauze. This gauze frequently becomes clogged up with carbon from the burned dirt and impurities in the gasoline. To avoid a recurrence of this trouble I

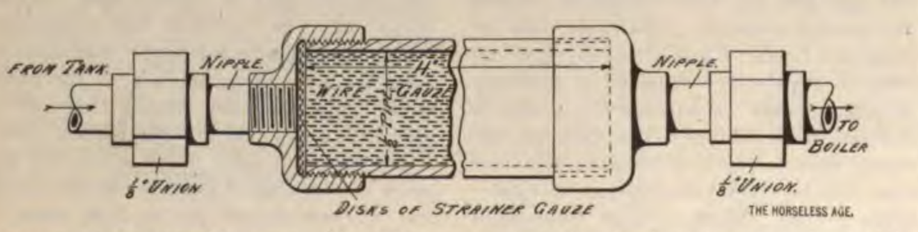
MADE A GASOLINE FILTER

and attached it in my gasoline line by cutting out a portion of the line between the tank and the boiler. I have had no recurrence of that trouble since. The filter is made out of a piece of one-half inch brass water pipe, 4 inches long, with a thread at each end. You can get it at any plumber's. Let him take two brass caps, with thick ends, to fit the pipe, and drill and tap these ends for one-eighth inch gas pipe. Smooth the ends of the one-half inch pipe inside and roll up a piece of copper wire gauze about 16 mesh to the inch—the gauze used under some of the burners answers very well—as tight as it can be rolled, and push it into the pipe. This roll of gauze should be about one-half of an inch shorter than the length of the tube. A couple of disks of strainer gauze fitted nicely to the inside of one of the caps add to the efficiency of this filter. Now screw the caps on the one-half inch pipe and a short nipple into each cap and screw the female end of a one-eighth ground union in the end that is to go nearest the tank and the male (swivel) part of a second union on the end toward the boiler. Now screw the remaining parts of the unions on their respective ends of the cut gasoline line, insert the filter in the line, and you will have a filter that will do the work and which can be removed in a few minutes and easily cleaned. In screwing on the caps, unions and nipples use common yellow soap. It is best to let these joints stand over night before turning the gasoline into the line.

The valve wheel which controls your main fire should be located alongside your throttle valve, for on level roads you need very little fire, but when you come to a hill you simply turn your valve wheel a little and you have the extra gas when you want it. The running gear is important, but you must use your own judgment or get someone of experience to examine your prospective purchase. Your machine should have a pair of good tubular lamps and a small lamp for the water glass. A cyclometer is a great convenience, as with it you can estimate the quantity of gasoline you have used. A good set of wrenches and tools and an oiler should accompany each machine.

STUDY ITS ANATOMY.

After you have purchased your machine the very first thing to do is to study its anatomy. It should hardly be necessary to tell a doctor why. When you know it in its healthy condition it is not so hard to recognize its illness. Buy a little book on the construction of the steam engine if you are unfamiliar with it, or read the series of papers published in THE HORSELESS AGE. The book of directions furnished with your machine should be committed to memory.



We will now take the machine out for a short run. You were taught to run it forward, backward and to turn. We will suppose you have a Kelly or a similar generator. Fill your tank with soft water. Should you live in the country and have hard water, catch rain water, or treat the hard water with chemicals. Now pump your boiler at least half full and when running see that you always have that much water in your boiler. I should have told you to take the little check valves out of the ends of the two valves between the boiler and the ends of your water glass. These were intended to close automatically should your water glass break and thus prevent loss of steam and water. They are very apt to stick, and when they do your glass may show plenty of water and still none be in your boiler, the result being a scorched boiler, with its quickly dropping steam and a tow in for repairs.

HOW TO START UP.

Now fill your gasoline tank, and with your foot pump run up 10 or 15 pounds of air on the gauge. Open the gasoline valve near the tank, after seeing that the valves near the burner are closed tightly. Run the generator cup full, turn off the valve again and light. After two or three minutes' burning the cup will be nearly empty and you can reopen the same valve. In three to five minutes more your generator will be hot and you can open your main fire valve a little. Should your fire sputter or burn white your gasoline is not yet vaporizing and you should shut it down for a few minutes longer.

NEVER TRY TO FORCE GASOLINE.

It is perfectly safe when used properly and seldom explodes—only when mixed with certain proportions of air—but it will burn. Be careful not to turn too much gasoline into the burner at first, as you may flood it. While you are getting up steam oil your engine. Pour oil *into* every hole. Every oil hole should be provided with a self closing dustproof oil cup. I have "Tucker's No. 6" on all bearings about the engine. It does not suffice to point the oil can at the hole, but you must put the oil in the oil hole; also oil the slides freely. You cannot use too much, and oil is cheap. Pour a little oil into every oil hole you see around the running gear. For the engine and running gear use a good grade of what is known as engine oil. For the cylinders use cylinder oil, which is much heavier. Both should be pure mineral oils, containing not one particle of any animal or vegetable matter. All mineral oils contain carbon, an organic element. Fill your cylinder oil pump and with the hand move the ratchet wheel around eight or ten turns, so as to force some oil into the cylinders, for the cylinders get dry and rusty after standing but a few hours. Now inspect the different parts of the machine just the same as a locomotive engineer does with his machine. Look carefully at the steering device and keep it and the bearings in the brake mechanism well oiled. Take a peep at your sprockets and chain. Probably

there is nothing wrong, but you will feel better satisfied. It only takes a few minutes to examine the entire machine when you do it systematically. While you are oiling the machine you noticed steam escaping from the safety valve, which you intentionally left open so that water in your steam line would be blown out and not get into your engines. Close the safety valve and open your main fire valve a little more. When you have 20 or 30 pounds of steam you can open your valve two-fifths or one-half turn. There is no necessity for opening your valve more than one-half turn at any time except when just starting up, the engine being cold and very little oil in your cylinders, and when climbing hills. After your machine gets warmed up, if your oil pump is working well you can close your valve again to one-half turn. You should use about one-fifth of a pint of good cylinder oil for each 10 miles and your engine should be oiled every 15 to 25 miles, especially the slides, wrist pins and tanks, less often if you have oil cups on bearings.

BEFORE STEPPING INTO THE CARRIAGE

see that the valve in the water line is open, your pilot light burning just high enough to escape being blown out and that the windows in the fire box are closed. In starting up you should open the throttle slightly and run very slowly a few feet forward; throw your reverse over and run the same distance backward. Repeat this procedure until you feel no bump in the engine. Very few small engines are provided with cylinder relief cocks, and should you turn the steam on suddenly after the machine had been standing for several hours the pressure of the water from the condensed steam in the cylinders might possibly blow off a cylinder head. Now start off on your rounds. At first you may notice that your steam does not stay up as well as you think it ought. You may have to turn your fire a little higher. This will be all right when the engine gets warmed up and the oil is flowing properly. Just as soon as you see the steam getting up to about 160 to 180 pounds you can turn the fire down, and here is where you see the advantage of having the wheel controlling the main fire valve right at your hand. Notice that hill ahead of us! It has a grade of about 10 per cent. or a rise of 1 foot in every 10 feet. Were it a short hill you could leave your throttle as it is and run right over it, but as it is a long one you must take it differently. Turn up your fire a little and go up to it rather carefully and open your throttle just enough to mount it and not allow your steam to drop. Take your time. As your steam is staying at 175 pounds you can open your throttle a little more, but just as soon as you see you are losing steam you must close the throttle a little, or on a steep hill stop altogether until steam rises again. A Mobile climbed a 45 per cent. grade in Madison Square Garden.

IN HILL CLIMBING

you will find that a liberal use of cylinder oil will do more good than any amount of fire you can put under your boiler, so open the valve of your oil pump a little when the engine is working hard, not forgetting to shut it down again after reaching the top of the hill. Now, what if your chain should break while ascending this hill? Should such an accident occur you should, first of all, keep cool; apply your brake firmly, but not suddenly, with a shock, as you do not want to break or bend the brake step or any other part of the mechanism. If you have a good brake your machine will stand still. If your brake is not tight you will start backward, slow or fast, according to the degree of grip your brake band has on the drum. In either case you have but one object in view, and that is to turn your machine across the road or gradually let it back into the gutter. Just as soon as

A NEW JERSEY DOCTOR'S AUTO AND HIS FAITHFUL CHAUFFEUR.

you notice that your chain has broken, or, in fact, when anything happens, it is well to get into the habit of immediately turning off your fire. A lurch into the gutter might bare the surface of your boiler for an instant, with the usual result—a scorched boiler.

Well, your chain has not broken, and we are at the top of the hill and going over the other side. Close your throttle valve, turn your fire down low or entirely out. Your pilot will light it again when you want it. Keep your foot on the brake and at no time must you let the machine get away from you. While going up the hill you used more water than you did while on the level, but your glass still seems half full, but you must remember that as you are going down hill there is a higher level of water in the glass than in the boiler, so take advantage of coasting and fill your boiler until the glass shows nearly full, but do not fill the boiler so full that you cannot see the water line in the glass, as it is very confusing to the eye and you might blow a cylinder head off by the water getting into them. You must turn on your fire again, as the more water you put in the boiler the more fire you need to heat it. This also is true of speeding. When you get to the top of a hill and do not close your throttle a little, but let your machine run ahead, you will notice that your steam will go down. This is due to the amount of cold or slightly heated water that you are throwing into the boiler. The faster the engine runs the faster the water pump works.

Your brake seems to work perfectly. A good brake should hold your machine on a level place when the steam is turned on full, whether the reverse lever is thrown forward or backward. Should your brake not hold when going down hill simply throw your reverse lever back a little and note the result. Contrary to the popular idea, this does not harm your engine in the least, as any old railroad engineer will tell you. They are in the habit of reversing their locomotives without even closing the throttle. Here is a level road and we will work our steam expansively. Volume 10, Nos. 21 and 22, of THE HORSELESS AGE very neatly explains the workings of the valves in the engine; in fact, that entire series should be carefully studied by every owner of a steam machine, and I would suggest that the publishers compile the articles and bring them out in the form of a handbook. These papers, together with a complete article on the care of the steam automobile, would prove of inestimable value to all interested in automobiles and steam engines, especially beginners.

You have probably noticed the notches in the quadrant of a circle over which your reverse lever travels. You are traveling along at a nice little clip without using much steam. Now, move your reverse lever back to the first notch and you will notice that your carriage will run faster

and you are not using any more steam. Now, do not move your throttle at all, but move your reverse back another notch and you will shoot forward faster yet. Of course, there is a limit to shortening of the valve stroke, as it is called, and should you get back too far your engine will knock, as when the reverse lever is on the centre both ports of each engine are closed and the steam cannot get out of the cylinders. You can run along with your valve stroke moderately shortened and use very little steam, turning your fire down until you are using very little fuel, and as you approach a hill gradually lengthen the stroke again. I made a little run of 37 miles, with two in my machine, up one hill and down another, with very little level road, in three hours, and used less than 3 gallons of gasoline. I have a carriage made late in 1901. It is equipped with Mason engines and a 14 inch copper boiler.

ADDED PARTS AND CHANGES.

I equipped it with a Reason air pump, a Manzel oil pump, auxiliary throttle valve, put a perforated pan under the fire box to keep the fire from blowing when running against the wind; put on a gasoline filter, already described; brought up the main fire valve wheel by three knuckle joints to a position just back of the throttle valve. I replaced three rotten tires. I have traveled more than 3,000 miles and my entire expense, including changes, additions and new tires, has run me very little more than 5 cents a mile; possibly not 5 cents. The actual cost of fuel, etc., was not 1½ cents a mile. I did not like my copper tube burner, as it burned back, so I intentionally allowed it to burn out and replaced it with an all steel burner. The air and oil pumps should have been put on by the manufacturers, and they are not repairs. I scorched my boiler the second day I had the machine and that cost me $11, including the towing. The manufacturers neglected to put in a water heater and ringed pistons, both of which I deemed necessary and supplied the same. These also never need be replaced. Three of my tires were absolutely rotten and the tire people replaced one and I bought two others.

FOR RECREATION,

I like to tinker with my machine, and at the present time I am going over it and replacing worn parts of the engine. It is a form of recreation that the doctor will find relieves the tense nerves, gets his mind off grunts and groans and gives him bodily exercise which he would not have taken otherwise. I have driven horses and thought they were all right, but you don't feel right driving a horse on a hot day, and there is no greater pleasure than taking a trip with your family or a friend out a nice country road 40 or 50 miles during a hot Sunday. Unfortunately, just as I have my machine where I want it I am forced to sell it to get a combination two-seated steam machine, as my children are too large for the little detachable seat I had made for the dashboard.

CARE OF THE MACHINE.

When you bring your machine in do not fail to wipe the dust and excess of oil off the engine; close your air, gasoline and water valves; see that your fires are out and examine your steering gear and wheels. Should you find broken spokes, jack your wheel up and see if it is running true; the chances are it is not, and you can easily true it by loosening the spokes on one side and drawing up the ones on the other. When picking the spokes like you would a guitar, if the wheel is true they sound nearly alike. Don't pack your pump too tight. If the water fails to rise in the glass, open and close the bypass a few times, and if it still goes down look into your tank. If the tank is not empty, pump the boiler half full with the hand pump and start off again, and more than likely the crosshead pump will work all right. Should you notice that you are not steaming well, look at your oil pump; possibly your cylinders are not getting enough oil. The pump should not feed so fast that you can see oil at the exhaust, but the exhaust water should seem greasy. A pint to 50 miles is a liberal quantity. The plug for your gasoline tank may leak; take off the leather washer and put on a lead one.

Keep the steering gear and all bearings of the brake mechanism well oiled, except, of course, the drum and band. Two or three drops of oil on the drum occasionally make it grip tighter; not at first, but after it has soaked into the shoe. Use dry graphite on the chain, which gets enough oil from the engine. Look at your engine sprocket. It sometimes works loose and gives a bump to the engine. Should your fire not burn a blue, copper tipped flame, you are using too low grade of gasoline for that burner or you are getting too little air. Let your boiler cool down and then see if the mixer tube has not moved out. They do it sometimes. If a new burner smokes you may have to cut a part of the funnel end off the mixer tube or set the mixer pin further out to get more air or reduce size of minute hole in mixer pin or nozzle. Sometimes it is necessary to set the mixer pin out three-eighths of an inch beyond the face of the mixer tube. For a steam machine gasoline of 70 degrees test is really best. The nearer you can get to carbon oil the more heat units you will get out of the fuel; when you go below 70 degrees it does not volatilize so readily, and you may have a white flame. Watch your oil man. I know of a man who sold oil of 54 degrees test for gasoline of 74. It would not work at all. Fire up slowly. A little graphite works well in your engine oil can, but do not put it in your cylinder oil pump or lubricator. It will not stay in suspension and stops up the delicate pipes. Use no animal oil or grease about your engine. In replacing balls in a ball race, fill the race first with graphite, grease, or vaseline and the balls will stay in place. Leave your cones a little loose, otherwise the balls may jam and get broken. Make a cement of asbestos fibre, fresh plaster of paris and enough water to make a soft dough, and pack it around every crevice from which heat or fire escapes. Covering the steam pipes, throttle, etc., assists in keeping the steam from cooling in them. Blow out your water glass twice a week and your boiler after each trip of 40 miles or more. Keep plenty of graphite grease in your compensating gear case. Don't let your tank overflow. It will cause your panels to warp.

Use soft water in your boiler even though you have to treat it chemically. Use no "boiler compound"; you will rue it if you do. Start off slowly and work the water out of your engine before going ahead. Take hills gradually. No matter how slow you are going a horse cannot pass you. Your brake should hold either backward or forward, with the throttle wide open. When not in use for several days put blocks under your axles to take the weight off your tires. Keep sand under the machine to catch grease, etc.

WATCH YOUR WATER GLASS AND WATCH IT OFTEN.

One Lesson Learned.

BY DR. JOSEPH STOKES.

In my automobile experience of two seasons the important lesson learned—a lesson hammered into me by many weary days and even weeks of waiting—is not to buy a machine from a firm that is not near at hand, or has not a fairly well equipped repair shop convenient.

I bought my machine in May, 1901, a three wheeler with an air cooled gasoline engine, and during that summer I ran it pretty regularly with much satisfaction. A few slight repairs were necessary which were promptly attended to by the Philadelphia agency.

My woes began in the fall when the agent went out of business. The company did not establish another agency, and from that time to this my experience has been a steady succession of vexatious happenings, and my machine a standing subject for the gibes of my friends. This season I have only been able to run it 1,000 miles, and since July not at all. The engine has been sent twice to the factory, being ten days on the way each time in each direction, and an indefinite time at the factory. When returned to me the last time it was assembled in such a way that it would not run at all, and a letter to the factory after ten days brought the cheering reply that the mechanic to whom they had entrusted the repairs, had "made a botch of it," but made no offer whatever to do anything to rectify their mistake. My letters are rarely answered under a week or ten days.

Yet in spite of all this I am satisfied that it is a good machine, and that if I were

ch of a competent mechanic who ghly understood it I would have rouble with it.

her have these experiences lessened thusiasm as to the practicability of tomobile for a physician's use, espe- where good roads abound.

o expense mine has not cost me so much to maintain as an extra -if I do not count depreciation. $65 would cover the total expense repairs and supplies each season.

ve no record of thrilling adventures, breadth escapes; with one exception ot home under my own power, and my machine is in order it is as re- is a ferryboat. But, alas! I am too om the factory, and they seem too take much interest in helping me

efore my earnest advice to those plating purchase is to select the re- op first, the machine afterward.

iddle States.

ience with Steam and Gasoline Automobiles.

By Dr. W. Webster Ensey.

about three years I have been inter- n automobiles, but it was not until two years ago that I became seri- nfected with the germ of automobili- d the fever developed in a violent After what was considered a thor- anvass of the subject, and obtaining from others who had had more or perience with the practical handling omobiles, I selected the steam mo- wer as the best for all around use physician, and in March, 1901, I my order (accompanied by the ash) to a prominent manufacturer of automobiles. I was solemnly as- hat the machine would be delivered three weeks after the receipt of the But, alas and alack! what a de- zing effect the manufacture of auto- s seems to have upon some men who is to entering the automobile field ed an excellent reputation for ver-

out going into details concerning egrams that flashed over the wires e letters that made the life of the cturer a burden, at last the welcome was received that the machine had been shipped. Consequently, about d of the first week in June, 1901, I proud manipulator of a steam auto- the second machine ordered by a ian in my city. It presented the features of a steam vehicle of two go, having a simple, double cylinder with a crosshead water pump and mp. The bearings of the engine were plain. I think it a mistake to have crosshead pumps, for they destroy the equilibrium of the engine and cause unequal wear and strain.

This machine did me rather good service, and while it had its advantages it possessed many disadvantages. I had a number of experiences with this steam vehicle.

TRYING TO CONVERT A FIRE TUBE INTO A FLASH BOILER.

One afternoon my wife and I rode out to the Soldiers' Home, about three miles from the city. Our trip out was uneventful, but on the return I noticed that the water in the glass was gradually getting lower, notwithstanding the by-pass was closed. Not having very far to go, I thought I could reach home without running any risk. But "when we say peace and safety, sudden destruction cometh upon us." Suddenly the fusible plug melted out and the vehicle was hors de combat right on one of the principal corners of the city. The vehicle was taken to the repair shop, not far away, and a new fusible plug put in place, but when water was pumped into the boiler it was found to be "leaking from nearly every pore." As a result of my attempt to convert a fire tube boiler into a flash boiler, I was deprived of the use of my carriage for six days, besides having to pay quite a large repair bill for rolling the flues. This was all due to the strainer at the exit from the water tank becoming fouled. The strainer was removed and no further trouble was experienced from that cause. This leads me to remark that if the water is run through a fine meshed strainer when the water tank is filled I consider all other strainers superfluous and really increasing the chances of scorching the boiler.

MANILA PAPER GASKETS.

Another afternoon my wife and I started out with the intention of going to a neighboring town about 7 or 8 miles distant. For several days I had noticed a hissing synchronous with the stroke of the engine, but as nothing could be seen I had failed to locate the trouble. Thinking one of the stuffing boxes might be leaking I tightened them, but the hiss continued. On this occasion the noise became more pronounced, and when climbing a rather long hill the steam pressure declined so rapidly I had to stop to allow it to recover. We reached our destination in good time. When returning I discovered that the leak was in the right hand cylinder head, and by this time had become so great that steam spurted through the asbestos jacket. Well, we had lots of time to admire the scenery along the route, for at frequent intervals I had to reinforce the crosshead pump with the auxiliary pump, or wait for the steam pressure to run up. We got home all right, however. Later inspection showed us that thick manila paper gaskets had been used. Determined to obviate any future trouble because of packing blowing out, soft sheet copper gaskets were fitted with complete success. I tried sheet copper on my present machine, but finally gave it up, as it could not be made water and gas tight.

TIRES AGAIN.

The most trouble I had was with the tires, which were of the single tube variety. The right rear tire exploded outright one day, stranding me 10 miles from home. For two weeks I was minus the use of the vehicle while the tire was being repaired at the factory. It had been on the wheel but one week when it burst the second time, while riding on smooth asphalt. The tire was sent to the factory again, and after some correspondence a new tire was furnished, as the old one could not be repaired satisfactorily. By this time I was so disgusted with pneumatic tires that I had a set of wood artillery wheels with 2 inch solid rubber tires fitted to the machine. I now thought I had reached the end of tire troubles, but it did not take long to find out that, except on very smooth roads, solid rubber tires are not adapted to the ordinary automobile. No doubt they are all right for heavy trucks, delivery wagons, etc., where the speed is slow, but I never want another solid rubber tire on a light or medium weight automobile. I did not need a bell, for the rattle of the machine notified people that I was coming, and as for the jar—well, it was guaranteed to settle one's dinner in short order, and was exceedingly hard on the vehicle. As for wood wheels, I am much pleased with them, because of their elasticity and the ease with which they can be kept clean. From an æsthetic point of view also I consider them superior to the wire wheel, as a substantial looking wheel corresponds more with the weight and size of the carriage.

A BURNER LESSON.

One windy day last fall (1901) the pilot light blew out and sprayed the burner full of raw gasoline. I turned off the gasoline and waited what I supposed was a reasonable time for it to evaporate. There was more gasoline in that burner than I thought, for when I attempted to light the fire with a match I had plenty of excitement. The flames burst from under the whole rear part of the machine and, fanned by the high wind, threatened to leave me nothing but a mass of warped scrap iron. I immediately became the centre of a highly interested crowd of observers on street cars, wagons and among the neighbors, and my active movements furnished great entertainment for them. By saturating the woodwork with six or seven large buckets of water I kept it from igniting while the gasoline was burning. I had thin flaps fitted into each end of the cross flue, but while it retained the heat in the boiler longer by preventing upward drafts of cool air, it had very little effect in keeping the fire from blowing out. After this trying experience I was always afraid to

allow the machine to stand longer than a very few minutes with the pilot light burning.

On January 1, 1902, I put the vehicle away for the winter, after draining off the water from boiler, tanks and pipes.

THE HYDROCARBON MOTOR.

In the latter part of March, 1902, I sold the carriage and turned my attention to the hydrocarbon variety. My next purchase was one of a popular make of gasoline runabouts. This machine I have been using in my practice with satisfactory results. Nevertheless, I have also had some "experiences" with it. At first the lubricator did not lubricate the cylinder, and before the obstruction was located the engine had become overheated and softened the rubber packing in the cylinder head. Said

PACKING BLEW OUT

one evening about 8:30 o'clock, while sixteen miles from home, and three miles from the nearest railroad station. I worked several hours in the attempt to remove the cylinder head, but a refractory pin in the cam shaft rendered all my efforts futile. I had no punches with me with which to drive out the pin, so, being late at night, with no conveniences at hand for repacking, I was compelled to abandon the vehicle in a carriage shed and walk three miles at midnight to the railroad station, where I took the early morning traction car for home. Later that day, armed with punches and all necessary tools, we returned to the seat of war, and after considerable labor we removed the cylinder head and put a new gasket in place, using sheet asbestos with wire gauze inside. On the way home a thunderstorm gathered, and while the lightning flashed and the thunder crashed we ran a wild race with the storm, but just as we got to the edge of the city it burst upon us with all its fury and we got rather wet.

A BROKEN WIRE IN THE SPARK COIL.

One Sunday afternoon in July last I took three friends out riding. When almost to the corporation line the engine suddenly stopped, apparently never to go again. I soon had the usual large crowd of curious spectators freely bestowing their advice. My friends were sent home on a traction car, and I began a systematic investigation. No spark could be secured at the plug. All wires were traced and found intact to the coil. The cover of the coil was removed and the shellac scraped away, and a broken wire found, explaining all the trouble. As it was impossible to make a good connection the machine was pushed to the side of the road, and later towed home. The coil manufacturer supplied a new coil, as the old one could not be made to work, there being evidently defective insulation deeper in.

OBJECTIONS TO STEAM POWER.

The chief objection to my steam vehicle was the time it took to get out in the morning, which to the physician is a very important desideratum. Many a beautiful day in the summer of 1901 I was compelled to leave my vehicle in the stable because of this. To fill the tanks, pump up air, generate steam and lubricate the engine and running gear, consumed about an hour. In my gasoline machine I can fill the tanks and oil the engine and running gear in fifteen minutes. Of course, to one who is using the machine simply as a pleasure vehicle, the saving of time would not enter into the question.

Again, in a steam vehicle there are too many gauges to watch, and after once burning out my boiler I never felt safe again.

Another very serious danger in the steam vehicle is the danger from fire, even when one thinks he is careful. A difficulty I had with my steamer was back firing when the pressure in the burner had been reduced by the regulator. When regulated, a strong gust of wind often blew out the fire altogether, so that I found the machine not to be very practical in blustery weather.

If the carriage was operated when the temperature was much below the freezing point (as we frequently have it in this section of the country), great care and watchfulness were necessary to avoid freezing and bursting the water pipes, steam gauge and water glass.

On the other hand steam is the most elastic power we have. It gives plenty of reserve power for climbing hills, which is a great advantage over the gasoline carriage, although I have never failed to negotiate all the hills in this vicinity with both my machines, and some of the hills are about as steep as one cares to climb. The positive reverse of the steam vehicle also adds to the feeling of safety of the driver, but there ought to be a more certain method adopted of holding the reverse lever in the position in which it is placed. Once or twice I barely escaped having serious accidents because the

ENGINE REVERSED ITSELF.

This may look like a small detail to some manufacturers, but I can assure them from personal experience that it is a very big one in the eyes of a steam automobile driver. To one who has operated a steam vehicle, its smooth running qualities and ease of control will always remain as a pleasant memory. Some of the disadvantages above alluded to have apparently been done away with by the introduction of the flash boiler, but the danger from carrying gasoline near an open fire still remains.

SOME DISADVANTAGES OF THE GASOLINE MACHINES.

In the gasoline machines many delicate adjustments are necessary before they will run smoothly or even run at all. The proportion of gasoline vapor and air must be just right under all the varying conditions of road use, and even when you think everything is just right the stubborn thing will refuse to mote. I have had such experiences at very inopportune times. Then all at once, before you can discover the cause of the balk, the pesky thing starts off as though it had not made you feel for half an hour or so like smashing it with an axe. Here is where an automobile throws the S. P. C. A.'s out of a job.

The most susceptible to derangement is the electrical part of the outfit for the production of the spark. So many things can happen, from the breaking of a wire inside the coil or a short circuit there to the loosening of a connection anywhere in the circuit, or a short circuiting in the spark plug by a crack in the porcelain insulation, deposition of carbon, oil or vapor of water. One can only acquire the faculty of preventing or overcoming these by experience. Theory is all well enough, but it is practice that makes the adept. I am learning something new about my machine nearly every day.

PROTECTED WIRES.

I wish it were possible to abolish the coil with its delicate and easily disturbed adjustments from the jump spark system. Anyway the wiring should be better protected from oil and weather. I had a short circuit produced by oil soaking through the insulation where three wires ran together. By taking out the defective wire and putting in three separately insulated wires the difficulty was remedied. Besides, I enclosed the wires in an oil and water proof covering to make them absolutely secure. It would cost but a few cents more to attend to these matters when the machine is being assembled, and the additional satisfaction would be worth ten times the cost.

After a 50 mile trip one afternoon through a great deal of mud, I found the engine and clutches full of mud and grit. It took me two or three hours to clean the machine. I had a light galvanized iron casing made to fit under the engine, doing away entirely with the nuisance.

TREAD AND WHEEL BASE.

A great deal of discomfort in riding results from a narrow tread and a short wheel base. Because of the former the vehicle fails to track in the wheel ruts of the ordinary country road, and the wheels of one side must run on the rough part of the road. The resultant strain and jolting are very hard on the machine as well as the passengers. A short wheel base produces unnecessary pitching and jolting in running over "thankee mams" and especially in crossing street car and railroad tracks in cities. My own machine could be very materially improved by lengthening the wheel base a foot or more.

CITY VERSUS COUNTRY USE.

At this point let me say that I consider city use of automobiles harder on the machines than country use. In the city the clutches are constantly being thrown out

and in and the brakes applied to avoid collisions. Then there is the frequent crossing of street car tracks, and last, but not least by any means, in the paved streets there are usually many cross ruts and holes where the pavement is worn away. Under these circumstances a vehicle is soon racked to pieces. Many of our unpaved streets are worse than any mud road I ever saw.

Some time ago I noticed inquiries in THE HORSELESS AGE as to the gain in power in Oldsmobiles by the use of a muffler cut-out. Two or three months after receiving my machine I had a cut-out put on and was surprised at the increase in power and speed when the cut-out is used. I have never made accurate calculations, but I believe I gain between one-half and one horse power. In fact, I pick up speed while climbing hills. Until I had this cut-out put on I never realized how much back pressure there is in an engine successfully muffled. In addition to the gain in power I find the engine runs cooler, due, I think, to the fact that the cylinder is able to completely empty itself of the hot waste gases.

OPERATING AND MAINTENANCE EXPENSE.

The steam machine was run about 1,700 miles from June 5, 1901, till January 1, 1902. In that time 232 gallons of gasoline were consumed, costing $25.12. This gives about 7½ miles per gallon of gasoline. The lubricating oil used cost $3.65, a total operating expense of $28.77, or a cost per mile of 1.7 cents. Repairs and changes on the machine during this same time cost $150.23, a grand total of $179, a total cost per mile of 10½ cents. This is not counting in the interest on the first investment, nor the depreciation in the value of the machine by wear and tear.

The gasoline vehicle from the first part of May, 1902, up to December 1, 1902, has been run at a conservative estimate about 2,500 miles. There is no odometer on the carriage, so the mileage is figured up from the average daily mileage. Gasoline consumed, 113 gallons, costing $13.56; lubricating oil and grease, 75 cents, a total of $14.31, giving an operating cost per mile of a little over one-half cent. During this same time I spent for repairs, improvements and supplies $35.96, and for new batteries $5.30, a grand total of $55.57, or a total cost per mile of nearly 2 1-3 cents. From appearances I will need a couple of new tires before next summer is well advanced. Counting in the interest on the money invested for six months, the cost per mile is about 3 cents. If the original price of the machine is included, the total cost per mile is 30 cents.

In conclusion let me say: Give me an automobile rather than a horse for my business, and let that machine be of the simplest kind that will do the work, and of medium power, from 5 to 10 horse power.

My Experience with Automobiles.

By A. H. CREPS, M. D.

After having taken several automobile journals for some months, I decided I wanted an automobile. And as I had been running a gasoline engine for several years in a shop which I have for my own amusement I thought the automobile with a gasoline engine for motive power would be the "proper caper," so I bought a second hand gasoline machine for $500. Second trip out with it I broke the bearings on the intermediate shaft, and decided to send the machine to the factory for a general overhauling, which the maker gave it for $147.89 (I believe that was the figure), and returned the machine to me. On running home from Lima, while going at about an 18 mile clip, and where there are large ditches on either side of the road, the steering rod broke, and fearing a sudden dart for one of the ditches, I told my father, who was with me, to jump, and I jumped. In jumping my coat sleeve caught on the larger of the friction clutch levers, which threw me under the machine, the muffler striking me in the back, and laying me up for about three days, and I still carry a large scar and a weak back as a result. The machine ran down one of the ditches and up against a fence with no further damage. I sold the above machine for $600 and the following spring bought a new light steamer for $760. Talk about trouble, this machine gave it. I do not believe there was a joint or a nut or any portion of it that I did not have to overhaul or fix in some way. And I never came in without having to put in from one to three spokes. Later on I equipped this machine with an air pump, the exhaust from which sounded like the exhaust from a mogul freight engine going over a heavy grade, so that I had to put on a muffler, made out of a piece of 3 inch tin water spout, 16 inches long, which remedied the trouble. I also put on a sight feed lubricator, trying about half a dozen different kinds, none of which proved a success. I believe in a mechanical feed oiler, or in feeding the oil to the main steam pipe before the steam enters the cylinders. I also put on a 3 inch chime steam whistle, that worked by pushing a lever with the foot in the bottom of the bed. This made a good signal for notifying farmers in wagons, also in the city, for in the city the gong sounds so much like a street car gong that people imagine on hearing it, if they are off the track, they are all right; but the whistle was sure to attract attention. Then it was a pleasure to me to toot the whistle. Some cities, however, prohibit such "noise," so they cannot be used everywhere. The horns now being extensively used are not loud enough. I also put on a morocco lined top, costing $11, which answered the purpose and looked as well as though it had cost more; a steam jet pump and hose to connect to the water tank, which would fill the water tank in five minutes and proved a very handy accessory, and a number of minor improvements too numerous to mention. Sold this machine to my father for $800, who afterward sold it for $450.

Last July I bought another gasoline machine with single cylinder engine, which I have run about 500 miles and which I will exchange in the spring for a runabout of the same make, equipped with a double cylinder, 8 horse power gasoline engine.

From past experience I can say without a doubt that the light gasoline machine, with double cylinders and ample power, say 8 horse power to a rig weighing 1,100 pounds, is the machine for a physician's use. I can now do the same work I formerly did with the horse in half the time and with more pleasure. The right kind of a gasoline machine, such as I have just described, is always ready day and night, while the steam machine requires time to get ready, will not go as far on one filling of the tanks and is more likely to freeze in winter. Electric machines, on account of their short running distance on one charge, are not to be considered at all for a country physician's use.

In regard to tires, after using a number of makes of both single and double tube tires, I think the double tube clincher the only tire to use. I have had a great deal of trouble with lamps. There are a number of good acetylene lamps on the market, so far as light is concerned, but they are too troublesome to get ready and keep ready, especially for an urgent night call.

A Light Gasoline Machine in a Wisconsin Doctor's Practice.

By J. O. NEWELL, M. D.

After running a gasoline automobile nearly two seasons I am as much of an enthusiast on the subject as ever, not only because it is a nice piece of machinery to run and take care of, but also because it is the most efficient and economical manner for a physician to make his professional visits. In the year and three months that I have had my machine I have been hauled home only twice, and there have been very few days on which I have not used my vehicle to some extent. The first time this happened it was due to the cylinder gasket blowing out. This was of the regular sheet rubber packing and was the same as that found on the engine when I received the rig from the makers. I was told to use asbestos, giving both it and the metal surface a coating of a mixture of shellac, varnish and graphite. I have never had a gasket blow out or leak that was made and put together in this manner, and can recommend this method of fixing the trouble when the head and cylinder are cast in separate pieces.

The last time I was hauled home both steering knuckles broke near the ball bearings. The company virtually admitted that the knuckles were too light for the

A SUBURBAN PHYSICIAN AND HIS CHAUFFEUR.

rig by replacing them free of charge on all rigs they had put out previously.

I think tire troubles will give one more to think about than anything else. The machine I have is a light rig, weighing between 700 and 800 pounds, and was fitted with single tube tires, which began to bother by leaking around the lugs. I sent one of them back to the factory to be repaired, but it only remained air tight a few days after it was returned, and I concluded to try and fix it myself and save the express charges, which were considerable. I secured some rim cement, such as is used to apply bicycle tires to rims, and dissolved it in gasoline, with the aid of a little heat, making it about the consistency of syrup. Then by removing the inside of the valve this can be easily injected into the tire by using a small bicycle pump. This will stop any small pin-hole leaks, and it does seem as if the small leaks bothered the most. If the tire got cut so badly that I could not use this method, I bought a thin inner tube, cut the tire open about 4 inches at the valve, washed out the cement I had put in and made a double tube tire of it. I have three tires fixed in this manner and my tire expense has been less than $15 so far, not counting one extra tire I bought so as to always have one on hand.

Occasionally the electrical connections will get contaminated and require cleaning, and in doing this I look carefully for broken wires. I have had a partially broken wire bother me for two weeks before I could locate the trouble. The engine will run with a wire in this condition, but as soon as some power is wanted it will stop, and it is one of the worst troubles to locate, as one will naturally think the batteries are weak until he gets a new set and looks further.

One of the drawbacks we have in Wisconsin is the cold weather prevailing for four or five months of the year, and we have to be careful on particularly cold days not to leave our rigs out too long, or upon returning we may find the pump inoperative and the water refusing to circulate. In this connection I do not see why some preparation of oil could not be used in place of water to radiate the heat from the engine. I understand some such material is being used in stationary engines, and would like to hear something on the subject through your valuable publication. I have not tried the calcium chloride preparation, but believe I have read that it would freeze when the temperature is around zero, and that is not an uncommon thing here during about four months of the year.

I think the ideal automobile for a physician in this city is one weighing about 1,000 pounds, having a single cylinder engine capable of developing 6 or 7 horse power, provided with two speeds ahead and reverse, the greatest speed possible being not more than 25 miles an hour and the lower gear capable of taking the rig up a 20 per cent. grade with two heavy persons. The seat should be amply wide for two, and accommodate three persons should necessity demand it. Such a rig could do the work of two horses and be just as reliable, provided a man knew something about the machine himself; and if one takes complete charge of it, it will cost less than the expense of one horse.

I am aware that a double cylinder engine will run with considerably less vibration than the single cylinder one and will develop more power for the weight, but, certainly, one explosive apparatus is easier to manage than two, and the latter must of necessity cost more to run; therefore for general utility I advocate the single cylinder machine.

Automobile Experience in a Western City.

By DR. CHARLES H. LEMON.

The automobile in large cities has become a necessary adjunct to the busy practitioner. After two years of practical experience it is the opinion of the writer that the kind of a machine a doctor should own will be governed largely by the character of his work. Where a doctor is engaged in a strictly family practice in a large city, and therefore has no need of an office in the central business portion of the city, the number of miles he travels per day is much less than the man who is engaged in special work, such as insurance examiners and corporation surgeons, whose duty takes them to all parts of a city. With this latter class the question of time is an important one, and everything connected with the machine must be made secondary to the important factor of time saving.

With automobiles, as with everything else, that which saves time costs money; so that to the man who has more time than money and who wants an automobile, but hesitates about purchasing one because he does not know how great the expense of maintenance will be, the economical plan is to purchase a light machine of standard make, with 4 or 5 horse power, weighing not to exceed 1,000 pounds, and costing not to exceed $600, with small pneumatic tires; this will proye a profitable investment. These machines may be seen every day on our streets, and the cost of repairs is proportionately low. They have sufficient horse power to carry one man through bad roads, and being small, one man can handle them in adjusting parts which may get out of order.

IMPORTANCE OF CLEANLINESS.

If, however, the matter of time is essential and the cost of maintenance secondary, it does not pay to buy a light weight machine for various reasons. A doctor who keeps a heavy machine, weighing between 1,200 and 2,000 pounds, will have business enough to warrant his keeping a man to care for it. Where the doctor and his man ride constantly together, greater horse power is needed. When an accident happens to a standard two passenger machine, it is necessary for a physician to have a man with him who is prepared to adjust the machine. There is a definite amount of dirty work about an automobile, however carefully constructed, that a busy practitioner should not get his hands into. The starting of the engine and the stopping and placing the engine at dead centre all consume time and are annoying, though trifles in themselves. Where one has many stops to make, this in itself becomes as troublesome as hitching a horse. There are many things which may nappen to a machine at any moment, which add nothing to the cost of repairs, but necessitate getting one's self mixed up with engine grease and mud out of all proportion to

the extent of the accident itself. To illustrate: The set screw which fixes one-half of our rear axle worked loose and allowed the shaft to come out of the tubing. Nothing broke, but we were delayed half an hour, and before we succeeded in replacing the shaft in the key of the differential, the hands of the chauffeur were filled with grease and his clothing with mud. Another time the cam which regulates the firing became loosened, necessitating getting under the machine on the road, and tightening three set screws in the most inconvenient place imaginable, between a large flywheel and the engine.

Nothing looks worse than a finely made machine that is badly cared for. A physician whose buggy and harness and clothing are alike shabby and dirty, can never expect to attract the better class of patients. Nor do patients or anyone else care to see a dirty automobile stop in front of their houses.

The writer owns a machine weighing 1,800 pounds that he has operated for nearly two years. It has always been well taken care of, and has been used almost exclusively in a city practice. The man who cares for it had no special training other than having been trained on a farm to use labor saving machinery. He readily adapted himself to this work, but finds that it takes as much time to care for this machine as he formerly spent caring for two horses. The machine is seldom out of condition on this account. Parts are carefully inspected, thoroughly cleaned and oiled at the close of each day's work.

THE ETERNAL QUESTION.

The question is frequently asked, do you have any trouble with the machine? In answering this question one's pride is somewhat touched, and the answer, it is feared, is not always in accordance with the facts. If one would reflect a moment such a question would never be asked. An automobile is a delicate piece of mechanism, and only an extensive experience can teach one how many things may go wrong with it, but this should cause no discouragement since only one thing happens at a time. When the defect is remedied it is apt to remain fixed for a long time. The experience gained in keeping the machine in perfect repair is what gives an operator confidence when he goes from home on a tour. If he has not mastered his machine by having personally superintended its repair and adjustment, he will fall by the wayside, and his subsequent experience will prove costly. The only plan for the owner of a good machine to follow is to allow nothing to remain on the machine which is known to be defective, and when the machine shows unmistakable evidence of lack of adjustment he should not rest until he has sought out the difficulty and remedied it.

THE REPAIR OUTFIT.

In a machine of the heavier type the great expense is the tires. A single set lasts on an average one year, as we cover about 6,000 miles in that time. Since the manufacturers have put on the market the repair outfit it is no longer necessary to have the tires vulcanized to repair a puncture, and our experience has been most satisfactory in the use of the repair outfit. The tires are 4 inch pneumatics, and one tire recently was punctured twice within ten days. The vulnerability of pneumatic tires to puncture is greater in wet weather than in dry. A nail on a hard road, if straight, is not likely to cause damage. On a muddy road the same nail sinks down till suddenly arrested by the firm ground below, and at the moment of arrest the tire plunges into it. We ran our machine eight months without a pucture, and then during the early spring five punctures occurred in three weeks.

SPARKING PLUG AND BATTERIES.

The two important features that must be kept in perfect order are the sparking plug and the batteries. Every machine should have two sets of batteries, so that if anything happens to one set the other may be switched on. If care is taken to solder all wire connections little or no trouble will be experienced on the road, and in our practice we use the second set, which is made up of small dry cells, to ring a bell instead of using a horn, and this set is never used to fire the charge except in an emergency.

We use the make and break spark, and find it both satisfactory and economical.

NEVER RETURNS TO HORSES.

After a physician has had even a limited experience with automobiles he finds it impossible to go back to horses. The time saved is so enormous that the matter of expense, even though great, becomes of secondary importance. Some very instructive articles have been written by physicians, giving the expense of operation that are certainly reliable, and it will be found that the matter of expense is in direct proportion to the amount of use the machine is put to. For a heavy machine $35 per month for gasoline, oil and repairs for an average of 20 miles a day is not excessive. It is difficult to imagine how a machine can be successfully operated for a less amount over rough city streets, which takes the life out of tires. With the light weight cheap machines the cost of operation will be less by one-half at least, but the same service cannot be had. It is the old question of factory made versus hand made road wagons over again. There are many doctors practicing medicine successfully and economically in $40 road wagons, but they do not use two horses nor constantly have a coachman with them, nor do they drive in and out of car tracks and over crossings and the rough paving blocks of the large cities.

THE AUTOMOBILE QUESTION

resolves itself fairly into the proposition what are you willing to pay for it. The writer would advise the man of small income to buy a light automoible that experience has proven successful. He would also advise him to beware of home made machines, experimental machines and junk machines. The replacing of broken parts is an easy matter when one is dealing with a large manufacturer. They are accurately machined and fit perfectly.

The electric car became a good substitute for the man whose practice required the keeping of a single horse. The light machine will supplant the electric car again with this same individual. Let us understand that the automobile is a practical success, and let the writer assure his readers that even $35 per month for maintenance and repairs, aside from a man's wages, is not extravagant if a physician's practice would warrant the keeping of three horses.

The writer and his chauffeur read weekly THE HORSELESS AGE, and have learned

STABLING IN THE BASEMENT.

from it many profitable lessons. We have learned one by one to overcome difficulties in the way of adjustment of working parts from the thoughtful papers of Mr. Clough. The man who owns an automobile and is not a subscriber to a first class automobile journal is as badly off as the doctor who does not subscribe to a first class medical journal.

The automobile industry has reached a point in its development which brings the automobile within reach of the man of comparatively small means as well as the millionaire, and experience has proven the automobile to be so elastic in its adaptation to the various wants of users that it is no longer a question, will the automobile do the work for a physician as reliably as was formerly done by horses, but how much can we afford to invest that it may be done better than it was ever possible to do with horses.

My Automobile versus My Horse.

By Dr. A. L. Smedley.

As a preliminary to this brief exposition of my experience I wish to say that, lest there be some misunderstanding as to my knowledge of machinery, I had no knowledge whatever of mechanics previous to acquiring ownership of an automobile. I possessed not the least idea of the construction of an engine, had seen but few automobiles, and had never had an opportunity of examining one until I received my own machine in August, 1901.

It came to me partly set up. There was no book of instructions, and I had nothing by which I could be guided in an attempt to put the machine together. However, I did put it into proper shape, and in a very reasonable space of time. I felt that the operation of it at first should be entrusted to skilled hands. I employed an engineer from a local factory to test the machine and make the initial run. It was placed on skids; the water, gasoline and air tanks were filled, and after a series of attempts we succeeded in getting a fire under the boiler, which, by the way, we had partly filled with water with the hand pump.

As soon as sufficient steam had been generated the machine began to run, but fortunately it was yet on skids and could not run away. The machine could not be properly controlled because it was impossible to close the throttle valve. The fire was put out and experimenting abandoned for the time being.

The following day the engineer tightened the throttle valve and another effort was made to start the machine. Steam went up to 180 pounds, the fire was controlled by the automatic regulator and everything seemed favorable for a successful first run.

We took the machine from the skids, and taking our seats the engineer slowly opened the throttle with the engine in reverse action, and as the machine moved a little too fast at first he attempted to shut off the steam. The result was that the throttle was thrown wide open, and the machine ran into a wooden fence, tearing down about 20 feet before it was stopped. The engineer was white with fear. He jumped from the machine and although I had received a nerve twisting scare I was satisfied, as soon as I could collect my wits, with the way the machine was acting.

We found that no damage had been done to the machine. The engineer, however, was afraid and could not be induced to enter it again. I was very certain the machine was all right and determined to master it. I took the throttle and steering bar, and was surprised at the perfect control I had over the machine. I had never before handled the throttle of an engine, and probably it was my lack of knowledge regarding engines that prevented my making the engineer's mistake, for the throttle of my auto closed exactly the reverse of other types of engines.

My accidental discovery of how to control the engine gave me immediate confidence, and I have never had any fear of the machine since that first moment, and I declare without hesitation that I have always since then felt safer in my machine that I ever did behind any horse. This is because I know the machine will do exactly and instantly what I make it do, while no horse can be depended upon for certain and immediate action in an emergency.

BURNER TROUBLE.

From August, 1901, I began the almost constant use of my automobile. My first trouble with it occurred about a month after I commenced its use, when the burner began to back fire. Since then I have frequently been compelled to remove the burner and tighten a few air flues to prevent this back firing, and I consider my burner the weakest point in the construction of the entire apparatus.

I have used my machine almost constantly regardless of the character of the weather. I have run it night and day on the streets of our city, which are rougher than any country roads that I have ever seen, and which are seldom free from mud or dust of great depth. I have run it on the snow when the temperature was so low the steam gauge was constantly frozen while running, thawing out again when a stop was made.

My machine has readily climbed any grade that I have yet encountered, and one hill in particular afforded an excellent test of the power and strength of the machine. This hill rose 50 feet in a distance of 100 yards, and was covered with loose gravel. I did not expect to succeed in my attempt to mount this elevation, but the machine went rapidly and steadily upward without the least indication of stopping. I readily passed horse vehicles going up. I have climbed one of the largest and steepest grades in this section of the country, with three persons in the machine, the combined weight of whom was fully 500 pounds.

DOES ALL HIS WORK WITH IT.

I can do all of my outdoor work with my automobile in less than one-third the time it required with my horse. I can get up steam and be away on my professional calls in less time than I could ever have my horse delivered at my downtown office from the livery where I kept the animal, and make a trip in one-third the time it was ever possible to make it with a horse.

I always took a keen delight in driving a spirited, speedy horse, but the sensation of exhilaration I experienced in driving my auto is infinitely greater than I could obtain in holding the reins over a horse.

EXPENSE.

Regarding the expense of maintaining the auto I can say that for the first year it was from one-third to one-half the expense of keeping one horse and buggy. The item of expense for repairs for the year did not amount to what it cost me to keep my horse properly shod for a corresponding period.

There is an immense amount of comfort in a knowledge that when I leave my automobile while making a professional call I will not on returning find it has taken fright at a street car or a flying piece of paper and run away, creating wreckage and havoc.

OBJECTIONS.

My chief objections to the auto, which may seem trivial to many readers, are: The grease spots from the machinery which I am constantly accumulating upon my clothing, and the remarks of inspired idiots, who would like to own an auto but can't, and who are always coming forward to make remarks about the machine being a failure or ask with joy if I have broke down; if I stop for an instant to see if there is water in the tank, to notice the fire or for any purpose whatever, there are always flocks of critical croakers to whom everything is a failure. My automobile has proven such a signal failure that I have disposed of my horse and depend entirely upon it.

KNOWS HIS MACHINE THOROUGHLY.

I am very confident that those who are declaring the steam automobile a failure after giving it a trial have never thoroughly mastered the machine, or really understood its mechanism. I have never employed any experienced person to do any work on my machine, since the attempt of the engineer to run it. I have taken it to pieces and minutely examined every part, and so thoroughly familiarized myself with it all that when running it at night I can tell by placing my finger on the by-pass valve stem whether the engine is pumping water into the boiler. I can, too, determine by the sound of the pump stroke whether water is being pumped into the boiler; by the "blow" of the fire, the amount of air pressure; by the way the machine steams the amount of water in the boiler, and by the sound from the water tank as I am jolted over rough spots in

the road whether the tank is getting empty. Further I can determine by the sound of the engine strokes whether or not the cylinders are being sufficiently lubricated.

Regarding the quality of the machine, I believe the materials used in its construction are strictly first class, but the manner in which it is thrown together, placed on the market and sold to inexperienced persons without any instructions regarding its operation is doing more to retard the popularity of the automobile than all else combined. I have run my auto on the snow, on wet and slippery pavements and under a variety of unpropitious conditions, yet with almost complete satisfaction to myself, notwithstanding the fact that my engine was placed at least two inches from the centre of the machine, where it belongs, which has caused the sprocket chain to fly from the sprocket wheel while going over a rough place.

CAPACITY FOR WORK.

As to its capacity for work I will state that I find I can get from 7 to 8 miles of travel from each gallon of gasoline consumed, and not 10 miles, as claimed by the manufacturers. When I say that in nearly every month from March 1 last I have used 110 gallons of gasoline, making 700 or 800 miles of travel each month, the work of two good horses, and at less than one-half the cost of maintaining one horse, the value of the machine to me becomes apparent.

TWO QUICK TRIPS.

One feature, a beneficial result of my having familiarized myself with my automobile and its entire management, an incident in point will prove: My office is located fully a mile from my residence, and the office of a brother physician, whose practice I assumed charge of for a portion of last summer, is in the same square with mine. On the night of August 14 last a fire broke out in this square midway between the two offices. At 11:20 the alarm of fire was rung. A fire house opposite my residence rang the alarm, immediately followed by a general alarm. I arose at this. By telephone I learned that the fire was in the building in which my brother physician's office was located. I partly dressed, went to the barn and started the automobile fire. I went back and finished dressing. Going to the stable again I found steam was up. The streets were deserted, so I turned on all steam and arrived at my office as the fire department reached the square.

The other physician's office I saw was in danger. I wished to apprise his bookkeeper of the threatened destruction of the office and went to her residence fully half a mile distant. I called her up and took her to the fire, arriving at 11:45. In twenty-five minutes, then, I had made two trips to the fire, starting in with a cold boiler and burner. This seems almost incredible even to myself, but the statements I make can be entirely verified.

There are now four or five automobiles in our city, some giving satisfaction, others not. In the local list of dissatisfied automobile owners I will cite the case of one man who has been particularly severe in his denunciation of automobiles. This individual has owned three different patterns of machines. He has had a technical mechanical education and has passed a good portion of his life in the manufacture of engines and machinery. I am sure the fault has been with the operator rather than in the deficiencies of the machines. He has, I am confident, handled his automobiles as he would undertake to manage a horse, going blindly ahead to run the machines to suit his moods, overlooking the necessity of skill in management and knowledge of the construction of the mechanism. In the hands of this man each machine has been a failure, and he wants no more of them.

So far as concerns the value of the automobile to the physician I declare without equivocation it is of inestimable value. I am satisfied that any successful physician who will take the time and exercise the patience to learn his automobile thoroughly, its construction and management, give additional study each day to its construction, note its normal workings and the symptoms of impending danger, doing all this as he has studied his patients, will have the same success with his automobile. Without apology for apparent egotism I can say I have had success with my automobile, and any physician or other intelligent man can have such success with his as to become an enthusiast concerning it, if he will give it a little time and study.

While the expression may be hackneyed in its various applications I say positively that could I not secure another automobile mine could not be bought for many times its original cost.

Improvements in a Steam Carriage for a Physician's Use.

By Clovis M. Taylor, M. D.

During the past three years I have had a vast automobile experience. I have studied the different motive powers thoroughly, though I have been a user of steam only, believing this to be the reliable power. I wish to say at the outset that the majority of people who are dissatisfied with steam automobiles have sufficient reason to be displeased, as worthless machines have been imposed upon them to the extent that steam as applied to automobiles was given quite a setback up to recently.

It would be useless to go into a detailed discussion of the demerits of the early steam machines. Every one who has owned one knows about their imperfections. The manufacturers are wholly responsible for the temporary displacement of the steam automobile. This, however, should not discourage the steam industry. Steam moves the world today, has for ages, and will continue to be the important motive power, where reliability is considered, for centuries to come. Knowing that steam is reliable and that it has been misapplied, I set about to correct the design and construction of the steam vehicles in use up to the present time.

In the first place, the steam engine to work properly must be properly located, in order that its cylinders may be kept warm and that its bearings may be kept free from dust; besides it should be in view from the seat while in operation.

The engine should be of the compound type of four and six horse power capacity, with large plain bearings, crossheads and piston rods. All the parts should be at least three times stronger than the ordinary light steam automobile engine of today. It should be encased and run in oil. A six horse power engine will pull a 2,000 pound machine with four passengers up any hill nicely. The mistake has been that manufacturers figure more on the horse power of their engines than on the horse power of their boilers. Generally speaking, the horse power of boilers in use is estimated at 4; the engine, likewise, is estimated at 4; consequently, there is no reserve power to draw upon, and the steam cannot be generated as fast as consumed; it is therefore a matter of stopping or slowing up for steam. As ratings go, a 4 horse power engine in an automobile requires an 8 horse power boiler. A 6 horse power compound engine requires a 10 horse power boiler. Experience teaches me that the capacity of the boiler should be double that of the engine.

Another serious objection to the ordinary steam carriage is that too much heat is lost from the boiler by radiation. All of these boilers are made to extend below the carriage and the fire is exposed to the weather, and the up cross draught likewise permits of rapid radiation.

I have completely overcome these objections by placing the boiler in such a position within the machine that when once warmed it retains its heat. A force draught adds about 50 per cent. to its steaming qualities, doing away with the up draught system and likewise obviating the so called "burning back" of steam carriages.

A steam automobile must also be suitable for all kinds of weather, even the coldest. The aforesaid arrangement of having the boiler within the machine is such that no water and steam pipes are exposed to atmospheric influences.

I have found the automatic devices for regulating the fire on steam carriages efficient and satisfactory, but the fact remains that when the fire is turned low (as is necessary when standing or going down grade) a slight puff of wind is almost certain to extinguish the fire. Nothing can be more annoying. Furthermore, even when the automatic is released and the fire is burning with its normal vigor, it is not unusual to see the entire under part of the

carriage ablaze, on account of the fire blowing out beneath.

With the construction of my carriage it is absolutely impossible for the wind, no matter how strong, to disturb the fire in the least. The machine can stand about for hours without any disturbance at all, even in a hurricane. Furthermore, the fire in this machine is under observation while the machine is in operation; all fire troubles are abolished.

One of the annoying features in connection with steam automobiles is that too much work is required in the filling of tanks. I have, therefore, obviated this by using a gasoline tankage sufficient for 100 miles; water, 50 miles; lubrication, 100 to 200 miles. This diminishes the amount of work in connection with the getting ready of a steam carriage, as it takes very little time to add a few extra gallons of gasoline and water when the tanks are open.

The exhaust steam is made to heat the water in the water tank by means of a coiled copper pipe. The water is therefore carried to the boiler at boiling temperature, reducing the gasoline consumption. The gasoline tank protrudes into the tank in such a way that its walls become heated by the water in close proximity, so that pressure is continuously maintained. There is no need of pumping air on the gasoline at any time after the pressure is once gotten up. A pressure of 40 pounds at the beginning will at the end of about 50 miles increase to 45 pounds, even though the gasoline has been partly consumed. Hand pumping of air is therefore entirely avoided. A steam air pump, however, is attached to fill the reserve air tank while steam is up, so that the next firing will be provided for.

A sight feed lubricator of large capacity, connected directly into the steam pipe, insures positive lubrication; it can be so regulated that one, two, three or more drops per minute can be fed to the cylinders, as desired. The lubricator is so located that you can observe its operation from the seat while running.

Anyone who has used a steam automobile knows how unsatisfactory it is to observe the water glass through a reflecting mirror. In all such cases the boiler is under the seat, and the gauge pipes are taken from the boiler and carried long distances to the side of the carriage. These glasses are exposed to atmospheric influences; they are inconveniently read, and the gauges are continually breaking. I have my gauge attached to a large 3 inch column, which in turn is attached to a positive low water alarm, this being directly attached to the boiler, and my water glass is in direct view of the operator in front. It is kept warm, being encased, and a glass will not break until it wears out. I have used one glass for six months.

A steam automobile need not be so constructed that adjustments must be made beneath the carriage. Outside of oiling the running gear and wheels, which is not often required, there is nothing to be done about my machine which cannot be done in an erect posture. There is no necessity of getting under the machine for adjusting or for firing up. There is no mechanism but what is easily accessible without moving or interfering with anything except that which you wish to adjust.

In brief, I would say that my automobile can be stripped of its machinery in fifteen minutes' time, including the removal of engine and boiler. A metallic hood, divided in the middle, each half being hinged to the sills of the body, is opened like the lid of a trunk, exposing all the machinery, in less than a quarter of a minute.

Experience has taught me that running gears have been too lightly constructed. I use no axles or spindles of less than one-half inch diameter. I use roller bearings on the rear axle and front where balls are used; these are one-half inch in diameter.

Some Experiences in City Use and Deductions from Them.

By E. Fletcher Ingals, M. D.

A self propelled road wagon was one of the earliest dreams of my boyhood over forty years ago, therefore when the automobile came into being I was at once deeply interested. I read everything that I found in the daily press about the machine and subscribed for The Horseless Age immediately after I saw the first number. Since then I have watched with the keenest interest the progress of its development, and have waited impatiently for the time when the machine would become practicable for ordinary use. Several times I was on the point of ordering an automobile, but I would learn through the trade journals or the daily press of obstacles to the satisfactory management of the machine, or of defects in construction, or of the unreliability of some of the manufacturers, which would deter me from purchasing.

BUYS A STEAM MACHINE.

Finally, a year ago last spring, believing that the machine had become practicable, I purchased what I believed to be the best steam vehicle. I have the good fortune to have an engineer in my family well qualified to manage a steam engine, therefore I had no doubt we could manage the automobile; but a comparatively short experience convinced me that the automobile had not yet reached the degree of development suited to my purpose. Although we had no real trouble with the engine, the destruction of burners, the stopping up of pipes, the breaking of water gauges, burning out of boiler, breaking of pumps, etc., put the machine out of commission for a large part of the time, so that at the end of three months I was glad to get rid of it at 20 per cent. discount on the purchase price. This, together with the numerous

Haynes-Apperson Gasoline.

Starting for the Morning Calls in a Minnesota Town.

repairs, had made it an expensive proposition, and the annoyances were far more trying than the expense. At that time it appeared to me that if the strength of the whole machine were increased about 100 per cent., if the pipes were made much larger and the boiler more capacious, if the wheel base was increased and the whole machine made more roomy, and if the ball bearings of the engine were discarded and the ball bearings of the wheels were substituted by roller bearings, the machine might be made practicable for those who were fond of mechanics. But even then it would hardly meet the requirements of a gentleman who did not care to be his own machinist. There was, however, one thing that did not appear to me likely to be overcome; viz., a slight leaking of steam, which came up about one's legs in cold weather when a lap robe was needed, and which proved to be most uncomfortable.

A GASOLINE MACHINE.

Several months passed, when, stimulated by the fortunate experience of my acquaintances and friends who owned automobiles, and as a result of extensive reading, I had concluded that the gasoline machine was most satisfactory, I ordered one of this variety. This time I again ordered the one which appeared to me the best of all those made in this country. It was a four passenger rig, strong in every part, having a 9 horse power engine and weighing 2,300 pounds. The machine came the early part of last April and was immediately put in service, but owing to excessive rains we have not tried it to any extent upon country roads; therefore it has been used nearly altogether upon the boulevards of the city. My engineer had no difficulty in running it at once, and very soon my coachman learned to manage it well. The troubles which we experienced in the beginning were those incident to lack of knowledge, and a few slight defects that had escaped the inspector's observation, resulting in imperfect workmanship. However, the manufacturers were very courteous and glad to do everything reasonable, and I felt that I was extremely fortunate in having purchased this particular machine.

TIRES.

A prolonged study had convinced me that a very thick single tube was the best for the tires, but I had only run about 750 miles even on boulevards when one of the tires gave out, not from puncture, but from leaking about the valve, and the manufacturer of the tires told me that it could not be remedied. A new tire was ordered and from this time on the tire difficulties were almost continuous; or, at least, I never felt any confidence in being able to make a run without coming home on a flat tire. This lack of confidence was so great that I never attempted but one run of 100 miles. Fortunately that day the machine acquitted itself well and none of the tires gave out. By this time I had had the machine about four months and had run it, all told, probably not to exceed 2,000 miles. The exact distance I did not know, because the odometer gave out when it had run about 1,600 miles and it was not replaced. With the exception of one new light single tube tire all of my tires were in bad shape, and I found that they had cost me over 7 cents a mile. An acquaintance who had used similar tires told me that his had cost him 10 cents a mile, and I came to the conclusion that the tire trouble, of which so little has been said in the daily press and the trade journals, was really the most aggravating of all. We have often been told through agents and advertisements that the motive force costs only from a cent to a cent and a half a mile, but very little has been said until recently about the cost of tire repairs. Inquiring among my acquaintances I found that nearly all of them had had similar experiences; but the clincher tire was highly recommended to me, and, as it was the pattern generally adopted by the French, who have had the most experience with automobiles, I concluded to have them put upon my machine. Therefore, while I was on my vacation the wheels were replaced and equipped with clincher tires, and when I returned everything appeared to be in good condition, but we had the machine out of the stable only three or four times before it pounded so that I was ashamed to ride in it, and all the efforts of my machinist failed to discover the difficulty. I consulted others who used similar machines, and one said that he had had the same trouble, but that experts were unable to find the cause of it, although they took the engine down completely. However, when it was put together again the pounding had disappeared—why, no one could tell. I secured the services of an expert, but he also was unable to discover the cause of the pounding. I then wrote to the manufacturers and found that an expert from their shop would soon be in the city, and I waited his coming to discover the difficulty. Upon looking over the machine he reported that the shaft was slightly bent, causing the flywheel to wabble, and that the gears were loosened. What other things, if any, had gone wrong he did not report, but advised that the machine be sent to the shop, which advice I promptly complied with. At the end of four weeks the machine was returned to me apparently in good order at a cost of a little over $100, but after running it about 15 miles the pounding (like that in steam pipes) was worse than before. It has not yet been remedied.

COMPARATIVE COST.

Although my automobile riding this summer has cost me over 25 cents per mile, I do not think it any more than the cost of horses for similar service. I have disposed of my horses, except one, and expect hereafter to rely on livery for such times as the automobile is unsuitable. One of the greatest difficulties in this city is due to the fact that there appear to be no machinists who thoroughly understand the gasoline engine. From the standpoint of a man who does not care to be his own machinist, I am forced to the conclusion that he who would ride pleasantly in an automobile must always have his machinist with him. The amount of grease and dirt that can accumulate on the person of a driver, even though he does not realize that he has touched the machinery, is something awful. Even the occupants of the back seat appear to have the soot and dirt so ground into them that they are not presentable after a few miles' ride, even though they keep within the limits of the city.

IN CONCLUSION

I may say that I have had all the experience I want with steam machines. I still like the gasoline machine, but do not think it suited to the person who does not care to wear overalls and jumper much of the time. The limits imposed upon the electric vehicle by the cost, and by the weight and short life of the battery, still appear insuperable barriers to its use by those who do not care to take on troubles. Some of these objections will doubtless be overcome by the development of other batteries, and probably the charging difficulties can be overcome for those who live in cities that have the alternating current; but these things should be carefully considered by the purchaser beforehand. There is no doubt that the gasoline engine will be still further greatly improved, so that the machines in which it is employed will become more and more serviceable. I can see no reason why ultimately the average man or woman ought not to be able to run such a machine, much as the average woman can now run a sewing machine; but if a really good storage battery can be produced, it would seem as though that would overcome most of the difficulties attendant upon running an automobile, although the tire trouble would still have to be reckoned with.

Mississippi Valley.

The Value of an Automobile to a Physician's Armamentarium.

By Dr. M. L. Mayland.

The writer practices in a city of about 9,000 inhabitants in the southern part of Minnesota, in the valley formed by the junction of the Cannon and Straight rivers. Located thus the surrounding country is very uneven and hilly, some of the grades leading out of the city being very steep.

A rainy and wet season, like the one we have just passed, makes traveling very dif-

ficult, especially since duty calls a man of my profession in all kinds of weather and over all kinds of roads. The "good roads committee" have not put in their appearance in this part of the country as yet, and you can imagine in what condition the roads are after several days of heavy rains. But in spite of all drawbacks I have been fortunate never to have been towed home by some old farm team, although I have had some calls which took me over very muddy and sticky roads, sometimes leading over farm land and meadows.

There are many automobile owners and prospective owners that have an awful dread of going beyond the city limits, for fear of having to be towed in. But such things would not need to be dreaded if they would only take a little precaution and look over their machines before they start or, better, every time they come in from a trip. A team of horses needs feeding after coming in from a trip and before starting out, and even when not used at all they need attention. That is where the auto is superior to horses.

As regards scaring horses, I have been very fortunate, and have not been the cause of any serious accident. But as far as public sentiment regarding automobiles is concerned it will simply have tó change and the public allow us our part of the road, without protest, the same as any other vehicle.

Now, in regard to the motive power. My own experience is decidedly in favor of gasoline motors, as they are less cumbersome and by far the most economical and durable. In fact, it is really the only automobile for the tourist, because you are able to make a day's journey without replenishing either gasoline or water.

Just a word as to the best kind of gasoline motor. Of course, authorities and also the best experts in this country and abroad differ as to the gasoline motor and different styles and arrangement of the machinery. As far as my own individual experience is concerned I should advise a two cylinder motor; that is to say, a double opposed cylinder motor with alternating explosions, as it will run with much less vibration than the single cylinder motor and will also develop power more uniformly. A single cylinder motor has less machinery and fewer parts to get out of order and is also less expensive than a double cylinder motor; and many claim it is more economical in fuel. As to the saving of fuel I wish to take issue, as my own experience goes to show that a double cylinder motor does not use any more fuel than a single cylinder.

Now as to the management of a gasoline auto. I find many automobilists have a good deal of trouble over very slight difficulties. If they would only stop all false movement or "monkey work" and use a little good common sense I will warrant that in most instances it will save them hours of crank hustling and mental anguish. It is well for the automobilist to always keep his eyes and ears open and be on the alert for any disorder. I would also advise him to get acquainted with the usual sound and vibration of the machinery when everything is working nicely. Then he can quickly locate the trouble when any does occur. When you hear a sound, thud or thump that is not familiar to you, I should advise an immediate halt and a thorough investigation to locate the difficulty and to remedy it at once. "A stitch in time saves nine." I will now cite a few of my own experiences.

One of the worst trips I ever made the last season was one cloudy afternoon when I was called into the country about eighteen miles to see a baby very sick with cholera infantum. The road was in pretty good condition when I started, considering that it is the worst in this part of the country. Although the sky was threatening when I started I got everything in readiness in a few minutes and started off at a lively pace. There were some big mud holes from previous rains and washouts, and being along the edge of the lake made it all the worse. Well, I reached there all O. K., making good time, but coming back I ran up against a snag.

As I started for home the daylight was fading and it had begun to rain. I ran at the maximum speed my machine was capable of about five or six miles. By this time the roads had gotten so muddy and slippery that I was losing time and could not make much headway. I was also in danger of going over the embankment, and the rain by this time was simply coming down in torrents.

As a rule I carry good three-eighth inch ropes for wrapping the rear wheels to prevent slipping, but this time, of course, the ropes were left at home. So long as I made eight miles an hour I kept on going in spite of the driving rain and mud. But when I got within six miles of home, where I had some steep grades to climb, I was obliged to go to a farm house to borrow a clothes line to wind the rear wheels so as to prevent slipping. After doing this I was able to make the grades all right. The people all along the route were simply amazed to see the mud we went through.

I will now cite another case to show the value of the automobile as a life saver in an emergency. I was called post haste over the telephone to a neighboring town to see a case of placenta previa with severe hemorrhage, the distance being about 20 miles. It took me just about five minutes to get ready, and I reached the house in just forty-five minutes. The road was not in very good condition, but I made good time because there were no steep grades. I found my patient in a very alarming condition, and it is safe to say in fifteen or twenty minutes longer she would have bled to death. The attending physician was well aware of the fact and can testify to the seriousness of her condition. Had I used horses it would have taken well onto three hours.

In conclusion I might tell of an amusing and seemingly "hoodooed" trip in which accidents seemed to come in a bunch; but in spite of all this I reached my destination in nearly schedule time. It was a nice Saturday afternoon when we started on a 40 mile trip. We had to get off the main road and travel over some low, hilly country. The roads were very rough, as they had not been driven over much since the last rain. I had gotten but a few miles out when I found my feed needle out of tension. This took me about fifteen minutes to regulate. I started again and had gone but 2 or 3 miles farther when I discovered I had a leak in the joint between the gasoline tank and intake valve pipe. We finally got that stopped by using ordinary wrapping string, the only thing at hand.

By this time I had reached the residence of the patient and was ready to start back for the main road. Just as we were getting onto the main road one of the braces of the carriage gear had worked loose and was pressing against the flywheel. I think this took me about ten minutes to retighten. We started off again and went along at the rate of 30 miles an hour until, within about 3 miles of our destination, we suddenly heard a spinning noise in the transmission gear box. I stopped the motor at once and found that the drive chain had broken in several pieces. It being a roller chain I picked up the pieces, gathered them together, threw out the defective links, shortened the carriage, replaced the drive chain and started off again, this whole proceeding taking about twenty minutes.

The next morning we started for home again and reached there without a single mishap or stop on the whole trip and made very good time. This shows how important it is to be ready to do small repairs yourself along the road when necessity demands it. I have never had to be towed in once in all my automobiling experiences.

In closing I might add that I have found automobiling a very healthful and beneficial exercise. Of course, taking into consideration a due amount of precaution, of all sports I find this to be by far the most exhilarating.

Mud Puts the Light Machine Out of Commission.

By Dr. Warren G. Brown.

June 21, 1902, I purchased a light gasoline machine with top and ordinary equipment, which I have run 1,970 miles the past summer, without ever having had to be hauled in, nor have I had the least trouble with it while on the road. However, I have never used it when the roads were muddy or very rough, having made my last trip November 6, since which time the roads have been in bad condition and

I have stored it away until the roads get good in the spring. I purchased an automobile principally for the pleasure one can get out of it, and am well satisfied with my investment. When the roads were good I did all my road work with it day and night, and it never failed me once, never even punctured a tire. I allowed the lug bolt burrs to get loose, and one tire began to leak. I injected a bottle of "Anti-Leak" fluid, and have had no trouble since. I allowed the differential gears to run the first sixty days without any oil, which cost me a new set of gears. Have had to replace a few bolts, an end steering spring, one cone, a battery of cells and a few other small articles, and those are all the repairs it has had—about $10 in all.

Our prairie roads are good when dry and smooth. No stones, gravel or sand, and very few hills. I made on the average about 12 to 13 miles per hour, and used about 1 gallon of 74 degree test gasoline for every 20 miles, using considerable more gasoline when I first ran the carriage than later, when I understood it better.

I tabulated a few of the runs I made in October:

14 miles in 1 hour.
12 miles in 55 minutes.
25 miles in 1 hour and 50 minutes.
33 miles in 3 hours.
21 miles in 2 hours.
13 miles in 1 hour.
67 miles in 6 hours.
6 miles in 24 minutes.
12 miles in 55 minutes.
11 miles in 44 minutes.
5½ miles in 20 minutes.
6 miles in 23 minutes.
5⅛ miles in 20 minutes.

I would much rather know the actual time the different automobiles make when run on our ordinary country roads, driven by doctors and men of limited experience with machinery, than to know the speed the racing machines and costly automobiles, driven by experts, can make on the perfect city and suburban streets.

There are times when I wish I had a faster rig. But when I stop to consider the moderate price I paid for my carriage, and the very little trouble and expense it has been to me, I feel well satisfied with my bargain.

What Doctors Want—A Season's Experience on the Illinois Prairies.

By Dr. James A. Matlock.

Now that the fad stage of the bicycle is past, thousands of persons still make use of the machine in a sane, conservative and useful way, because there is in it an inherent degree of utility. The survival of the bicycle has been because it has been proved to be an easy, cheap and pleasant agent for the transportation of a single passenger. As it has been with the bicycle, so must it be with the automobile. It must stand or fall according to the measure of its utility. If it were to take its place merely as a vehicle of pleasure it would have its little day and would go the way of all fads. If it were to retain its form as a complicated and fragile vehicle, requiring the constant attention of the expert and the repair man, then its use would necessarily be limited to those who either possess the mechanical ability or the wealth necessary to take care of such a luxury.

As a vehicle of utility the automobile has already taken such a prominent place as to make its future assured.

INCOME DEPENDS ON MILEAGE.

Coming to the point as to the use of automobiles by the public in general and by the medical profession in particular, it is safe to say that such general use will surely come about, but it must be preceded by a further development of the automobile itself. There is no class of men who are watching with keener interest the progress of the automobile than the physicians of the country. No class of men are more dependent on individual means of locomotion. Every physician in the land, except a few of the lesser lights resident in cities, must keep one or more horses, and upon the mileage of these horses largely depends the professional income. The average doctor spends considerably more time in travel than he does at the bedside of his patients. Many physicians, especially in the country, are liable at any time to be called on to drive 50 or 60 miles in a day, which travel is a good day's work in itself. It is small wonder, therefore, that most of us are ready to hail a system of transportation that, under ordinary conditions, promises to take us over the weary miles in less than half the time spent in prodding our horses along mile after mile. To most persons driving is a pleasure; to doctors it is hard and monotonous work.

To be relieved in part of this daily grind of travel was the object sought by the writer in taking up the automobile as a substitute for the horse. I have no inherent love for a horse, as some men have, hence it is no pleasure to drive one. I dislike to put a horse through a hard drive, especially in extreme weather.

In June of the present year I purchased a steam runabout. I have used the machine continually in my practice ever since, and to the extent that I have used it my expectations have been fully realized. My practice extends principally over level prairie country, but there are some steep hills within the limits. The roadbeds are exclusively of dirt—the

DARK, STICKY LOAM

of the Illinois prairies. In this section there has been an unprecedented rainfall this year, making the use of an automobile very difficult, as the roads have been either muddy or rough, without interruption. Ordinarily the roads are good, except during part of the winter and spring, so that, having passed with satisfaction through an extremely unfavorable season, I look forward to even more satisfactory results in future years under normal conditions.

The qualities which now recommend the automobile to the physician are those of speed, endurance, comfort in traveling and moderate expense of operating. In addition to these qualities there should be moderate first cost, simplicity, strength and durability. Some of these qualities are lacking in the lighter machines now recommended to the profession.

FIRST COST.

As to the question of first cost, there should certainly be no objection to paying $1,000, more or less, for a vehicle, provided it be one that will last a reasonable length of time and not be a constant source of annoyance from breakages and expense for repairs.

DON'T WAIT FOR THE IDEAL MOTOR CARRIAGE.

It is true that at the present state of development a physician may find in the market machines which will answer his purpose, and it is folly to wait until they "get cheaper" or attain nearer to perfection. The ideal doctors' motor carriage is yet to appear. It must be a vehicle of moderate cost, easily operated and kept in running order, and, above all, stout and durable in construction. The doctor doesn't care a great deal about fine finishing and light, airy bits of machinery which work like a watch for a time and then go to the repair shop or the junk pile. What we want is a machine built for long and hard service, and one which will keep running as long as managed in a rational and careful way.

On the Rolling Prairies of Iowa.

By Dr. Manning L. Allen.

I purchased my vehicle, a steam carriage, with top, at Davenport, Ia., on May 29, 1902. The next morning (Decoration Day) I left Davenport for home, the distance being about 140 miles by the wagon road.

We made the run to Tipton, Ia., 40 miles, in two hours and thirty minutes, stopping once for water. Here we took on 6 gallons of gasoline and 20 gallons of water. We then started for Cedar Rapids, arriving at about 1 p. m. Near Mt. Vernon we discovered that in some way we had broken the bolts holding the body to one of the rear springs, which caused us some delay in travel, as we were compelled to run slowly in order to protect the carriage from further accident. Also on this sandy stretch of road our air pump refused to work properly, thereby causing us further delay. At length, however, we arrived at Cedar Rapids, where we secured new bolts and repaired our pump, took dinner and again took the road for home, arriving in time for a late supper without further accident.

During the trip we took water six times and gasoline three times, thus using on the

trip of 140 miles 140 gallons of water and 21 gallons of gasoline.

FIRST ROUND WITH INSTRUCTOR.

The next morning the operator took me on my round of morning calls, both in the city and country. Part of the way the roads were very rough, and when we were out 14 miles the main burner became clogged; the operator let the steam die and let the water out of the boiler, took off the automatic cut off and removed the obstruction. This accident delayed us about one hour. The balance of the round, which took us about 40 miles, was made without further annoyance. The following day it rained hard, and my operator left for his home. Since then, with the aid of my son, aged fourteen, I have managed the carriage without assistance.

Some days everything works fine, then it is a pleasure to drive the carriage; at other times trouble is abroad, then it is not so much pleasure. My carriage is very easy to steer and control, as my youngest son, aged eight, can run it anywhere around town; he will watch the water glass, the air and steam gauge as carefully as a veteran driver. I have spent many happy hours with my auto, and expect to spend many more, notwithstanding the many unpleasant things that are constantly occurring.

Automobiles are as yet in the experimental stage, and anyone who purchases one will also purchase more or less grief. Sometimes I have felt as though I bought more grief and grease than automobile when I purchased mine, yet when you get everything fixed up in good shape and get in and go spinning over the pleasant country roads your troubles vanish as mist before the rising sun.

In my opinion there are several improvements that could be suggested to builders of autos for country use. The wheel base should be long, the wheels high, at least 42 inches, enabling it to clear the ruts and bumps of an uneven road, and should be made of wood; the frame should be of sufficient rigidity to withstand the jars and irregularities of the road; the body should be hung low and be securely bolted to the frame, and there should be nothing between the axles and frame excepting the springs, which should be long and flexible and of the platform variety. The practice of placing the frame below the springs is faulty, in so far as country roads are concerned, and should be discontinued. My machine is so constructed, and I am speaking from experience. This is the most objectionable feature I find about it, as it will not easily take the irregularities of the road. Then again, on steam vehicles the stop cocks should be made so that they can be regulated from the seat, thus saving clothing and the fingers, to say nothing of the inconvenience of the thing. Stop cocks, as a rule, are not opened often enough, and the reason is because it is so much trouble to get at them. Again, gasoline as a fuel for steam automobiles is too expensive and causes too much trouble; kerosene or charcoal should be utilized if proper burners could be constructed. The compensating gear has given me a great deal of trouble; one wheel will drop in a mud hole and the wheel upon which there is the least weight will spin around and the other will remain quiet and you will stick until someone helps you out.

AGAINST AUTOMATICS.

I am heartily out of sorts with all automatic contrivances connected with an automobile. If a man expects to make a success of running his machine he must study it until he understands it thoroughly; the principles of steam are simple and the simple engine can soon be mastered by careful application to business when you are running, and after you understand the mechanism it is a pleasure to run it. There is nothing that worries a man so much as a mystery, so I say master it.

FAVORS SOLID TIRES.

Another money saving improvement or change for the country driver would be the substitution of the solid tire for the pneumatic. I have both rubber and steel tires on my different buggies, and I am unable to detect any difference in the riding qualities of the vehicles over the country roads. Of course, in cities it is different.

NEVER REQUIRED A HORSE.

I will say for my steamer, however, that although I have been stuck in mud holes six different times this summer I have never had a horse hitched to my carriage and have never had any assistance other than a man or two to help me out, and I have never been hauled home, nor have I had to remain away from home on account of storm or rain. But there is no economy in running in the mud or when the roads are bad.

I have been enabled on fair roads to reduce the time of travel while on my calls to almost one-half, and what was formerly a long, tedious ride is now an exhilarating pleasure. I am thoroughly in love with the automobile and certainly enjoy mine as much as anyone, and the ideas I have advocated I believe to be for the good of the machine as I see it from the standpoint of a country driver using the carriage for both pleasure and business.

On the Plains.

Conditions in South Dakota Unfavorable to Steamers.

By B. A. Bobb, M. D.

In the year 1898 I commenced the study of the horseless carriage, and after two years I made up my mind that I would more closely investigate the merits of one by a little actual experience. Accordingly, in the summer of 1900, I purchased a steam machine, with all expectancy of cutting a wide swath. As stated, for two years previous to this time I had been studying the horseless carriage at such moments as I could find to spare out of my busy country practice. I had taken several of the automobile publications and found that there was nothing like knowing the why and the wherefore concerning the workings of the mechanism. I knew that if there were anywhere in the world fine roads for such a machine it was in South Dakota, where they are rough as glass and wet as punk three-fourths of the year.

My steamer arrived in a freight car about August 15 in a couple of small boxes, but before we could get it out we were informed that it would be necessary for us to interview the freight agent and square a little account that the railroad company had against those boxes. We told him that we believed that we had the wherewithal to square the account, although this made the third time that we had been drawn upon to square accounts for that machine—once when ordered, once when finished and now upon arrival. He told us that this was only a small item of $39.17, and also threw out a suggestion, all free of charge, that this was only the beginning of our troubles. We went down into our jeans for our little check book—we didn't have on our practice clothes this day, for we had come to unload and set up a machine and start out to gain more fame, in several respects, than we had accumulated during our previous six years of practice of medicine.

A TROUBLESOME SUBJECT.

We procured the assistance of a friend or two and commenced the operation. Just about this time we began to feel that maybe we had tackled a much more intricate and grave operation than we had anticipated, but as all the instruments and assistants were ready we felt it our duty to do business instead of turning our subject over to some more skillful operator.

Well, finally, to my great delight, she moved off so nicely for a while that you would think that she certainly had fully recovered. To be on the safe side, I thought I would take her home, and so went along with her. People had never seen me pay so much attention to a case of mine before, and actually they gathered about the streets in groups, and I even heard them make remarks about us. Some even said that I wouldn't remain with her very long, as they had seen similar cases and knew the results. I determined to make sure that she was all right before taking her home, and so thought that I would take her down to the fair grounds and see if she could track good. I had only gotten about half way down when I noticed that the pulse was getting weak, and in fact that she was getting weak very rapidly all over, and before I knew it her heart had ceased to beat and she stopped deadstill right in the middle of the road. I

looked about a little and soon found that I had an enormous amount of heat applied, and as I had not been supplying enough water in the right place she had become fearfully scorched.

In about a week she was convalescent and my consultant turned her over to me again. He said that he would charge me only $15, and that was simply for her board, as he also was interested in her case and wanted to see the ultimate outcome.

Well, she was not sick again, i. e., so seriously sick, for nearly a year.

I have run many a race with her when on my country calls at the rate of about 25 miles an hour. Sometimes she would run with me every day for a week without the least bit of trouble, and then again for a week she would be having all kinds of attacks; she would have attacks of melancholia, then an attack of hysteria, and I would have to put in two or three water gauges before I could get one to hold. Then, again, she would take a notion that she would frighten all the teams in the county. Notwithstanding all this, I verily believe that she has helped me to save the life of a few patients of mine that without her aid would have succumbed. I well remember one afternoon when a man came riding horseback into town from about 5 miles in the country, his horse white with foam and he white with fear, informing me that his mother was dying and asking me to get out to her the quickest way I knew. It so happened that I had just run my lady up to my office door and so put in my valises and started her off at once and was at the woman's side in a little less than ten minutes, and a very exsanguinated woman she was too, and life would have been extinct in only a few moments had she not had help immediately by way of a large hypodermic of atropine and saline solution.

A SCORCHED BOILER.

During the month of June, 1901, there was a reunion of the old settlers in a town

Giving the Children a Ride.

Starting Out on a Steamer.

adjacent to ours, and as it was a very nice day we decided to give up our practice for a day and enjoy the sports of the place, and incidentally to give a little demonstration on the track with our machine, as we had the only one within a radius of 50 miles, and it was somewhat of a curiosity. Several hundred people went from our town by team, and so, when all were started well on the way, my wife, daughter and myself got in, and when we got fairly started we just whizzed past everything there was in sight on the road for about 8 miles, when suddenly I noticed that all the water was out of the boiler, as indicated by the water gauge, and the steam pressure was rapidly falling. I stopped immediately and turned out the fire, but it was too late, as the boiler was already scorched and I was again out $15 and a wait of a week for the machine. Imagine my chagrin as team after team passed, whom I had passed only a few moments before, nearly all containing one or more kodak fiends, and they in turn getting a focus on us as we were trying to get our machine in shape to leave. Fortunately, a carriage (with horses attached) came along, going in the direction of my town, and so I sent my wife back to town for my team and carriage, which are kept at a livery, while I remained with the machine. She soon arrived on the scene with my horses and we were soon on our way rejoicing that none of us were hurt. I got the flues in the boiler expanded and used the machine the rest of the summer with more or less trouble and more or less sport, and this last spring I was fortunate enough to sell it at a reasonable figure.

HIGH WINDS AND EXTREME COLD.

Now as to the running of a steam machine in South Dakota. I recognize the fact that at the present time many improvements are being made on the steam machine, but until an improvement is made that will overcome the high winds and the extreme cold the steam machine will be more or less of a failure in this State. The roads are ideal for about nine or ten months of the year, but from November 1 to April 1 the weather is often so extremely cold that it will freeze the water in the tubes leading to the boiler in spite of all that you can do. Then, unless you have a warm barn, the water in the tank would freeze when the carriage was not in use over night. I have found that on most of the steam machines the water pump is not adequate, and often after running a few miles one has to use the hand pump to help fill the boiler, which is very inconvenient. This is also demonstrated by the fact that some manufacturers now put two pumps on their machines.

Another great inconvenience is the location of the water gauge on many of the machines. Having to look at this by a mirror and being unable to see it at all at night is a great drawback.

One can go against the wind all right, but when going with the wind, or sidewise of it, you will have the fire blown down and often out. Also, when standing, as when a physician is in to make a call, the steam will run up to the point where the pressure will automatically turn the fire down to a very small blaze, and then the vapor pressure is so light that the winds we have here will often blow the fire out. In such cases, when you come to your machine you must get in and run it a little ways, so as to get away from the excess of gasoline, or you will have a nice little explosion when you attempt to light it.

The expense of running a machine I believe should be counted for something. I am aware that most of the manufacturers maintain that 5 gallons of gasoline will run the machine from 50 to 60 miles. My experience teaches me that 5 gallons of gasoline on our roads and in the average winds that we have out here will run a machine only 25 to 30 miles, and at the price that we have to pay for gasoline (16 to 18 cents per gallon) makes it quite expensive to run. It is also claimed that 20 gallons

Boiler Scorched, 8 Miles from Home.

of water will run a machine weighing about 800 pounds 40 to 50 miles. We have found that on the average 20 gallons of water will run a machine out here 12 to 15 miles and no farther, so you have to keep filling the tank, which is no small task, as you cannot let it get entirely empty before refilling. I know that there are machines made now without a water glass, with which it is impossible to scorch the boiler, as a blowout plug is used, that have automatic pumps for the air pressure over the gasoline, and a score of other attachments that are most of them to be commended, but until the wind and the freezing can be overcome by some kind of an attachment I believe that it would be unreasonable to expect much from a steam machine for South Dakota for the physician's use.

The Rocky Mountains.

Eighteen Months' Experience with a Light Gasoline Automobile.

By Dr. F. L. Bartlett.

Most writers on "experiences" with automobiles have detailed mishaps, and given us very little of the advantages and pleasures to be derived from the use of the machine.

Eighteen months ago I substituted an auto for my horse, and shortly afterward disposed of the horse and cast my lot with the auto. I have averaged 450 miles per month during this time; have had the machine out of commission but eight days through actual breaks and repairs; have never been so badly stalled that I could not get home without assistance; and have run daily through rain, mud, snow and cold weather. In fact, I do all my business with the machine, from early in the morning until late at night. I had some trouble during the first six months, due, as I found later, to my own ignorance. Now I rarely have any breaks or mishaps.

My bill of expense has been about as follows:

Actual repairs	$46.50
Additions	45.00
Gasoline and supplies	80.00
Painting	15.00
Total	$186.50

Or an average of $10.36 per month. A horse and carriage for the same period would have cost an average of $22 per month.

I have my own stable and a full set of tools for making all ordinary repairs. I make all my own small repairs and take care of the machine, mostly because I find that I cannot trust the average repair men to do the work. As a rule, they do more damage to the machine than good, and I find very few shops that understand the gasoline engine. Such shops cannot have my machine to experiment with.

GOOD RULES TO FOLLOW.

I have been asked a great many times how I manage to keep my auto in constant service. The following simple rules are sufficient for any intelligent man to follow and get good and satisfactory service out of any standard make machine.

First—Understand the principle of the gasoline engine. Find out what each part is for and how it is adjusted. Ascertain what parts need the most oil, and, above all, find out all the weak parts, especially those which are liable to need frequent adjustment. Study up the battery equipment and learn to do the wiring from battery to sparking plug.

Second—Secure a good set of tools and carry all necessary ones with you, as well as extra wire, small bolts, nuts, screws, tire mending outfit and everything else you are liable to need on the road.

Third—Keep the running parts clean. Use oil liberally on all the bearings exposed to dust, and never use oil enough in the cylinder to cause blue smoke at the exhaust.

Fourth—Examine the machinery carefully at least once daily for loose nuts and breaks.

Fifth—Run your auto just as you would drive a valuable horse. Run slowly over rough roads and favor it all you can. Speed only when you have a good road under you.

There is no reason, so far as I know, why, if the above rules are followed, a well made auto should not wear at least ten years or longer. An ordinary steam engine will last fifteen to twenty years with constant use. There is no special strain on an auto, unless it is abused.

The machine I am using is a light one. I have had considerable experience with other makes, and believe many on the market are just as capable of good service as mine, if properly handled. I am not in favor of the steam machine for everyday business use, nor do I favor heavy gasoline machines. For ordinary business use a machine should not weigh over 1,000 pounds, nor have over 6 horse power, and when the racing craze is over this will be the standard everyday auto. With such a machine there will be no accidents, and the public will not object to them. One of the principal objections that I have found to all makes is inaccessibility. Every part of the machine should be easy to get at and take apart. This has caused more profanity on my part than all other things combined.

A FEW THINGS LEARNED BY EXPERIENCE.

I have learned a few things which are valuable to me. One is to carry a good live battery. I use a storage battery constantly and keep it well charged. I carry also an extra emergency set of dry cells. I keep good, solid points on the vibrator of my sparking coil, using No. 12 platinum wire. I use oil very sparingly in my cylinder and am careful not to use any more gasoline than is absolutely necessary to get a good explosive mixture. As a result, my sparking plugs last twelve months and are always clean. I know all the weak points of my machine, and thus know where to look when trouble occurs.

I have had no startling experiences; have not run over anyone or been run over. I never had to lie on my back in the mud on a rainy day to adjust my machine. I have never had to humiliate myself by asking some countryman to haul me home. I always let any other fellow who has the "rapid transit" craze pass me, and I just jog along to suit myself; and sometimes I meet the "rapid transit" fellow being towed home by a countryman with a $2 nag.

There are some men who never ought to own a piece of machinery more complicated than a screwdriver. Such men have no business with an automobile. I have no use for an auto driver who makes his way downtown constantly tooting a French horn. It means "get out of my way, I'm coming," and has done more to discredit the automobile than anything else. There ought to be a law against the use of a French horn. If a man cannot drive his auto without using a blatant horn, and do it with safety to others, then he should quit the machine and do his riding on the street cars.

The automobile is a good thing, and it doesn't need "pushing along." It will take care of itself if given a fair show, such as you would give any other piece of machinery.

My automobile house, herewith illustrated, is 10 feet wide, 24 feet long and 10 feet high to the eaves; it is built of brick and contains five windows and two doors. The floor is laid with porous brick on 6 inches of sand and gravel. The roof is of wood, shingled. The house contains a stove, a 15 foot work bench, three cases of shelves, a full set of tools, a small lathe, etc. The entire cost, outside of tools, is approximately $300. The porous brick floor is probably the only novelty. After using it four months and allowing oil drips and water to waste on the floor it still remains dry and clean, as the brick and sand absorb the oil and water completely.

While this auto barn contains a very complete set of tools, the writer considers the following list absolutely necessary for making ordinary repairs: One set monkey wrenches, 4 to 10 inches; one set Stilson pipe wrenches, 10 to 14 inches; one set cold chisels; one set punches; one set twist drills, three-sixteenth to one-half inch; one set S wrenches, up to 10 inches; three machinists' hammers, 1 pound, 1½ pound and 2½ pounds; one adjustable drill brace; two pairs wire nippers; one hack saw, 9 inches; one set soldering tools and blast lamp; one lot of assorted files; one set standard taps and dies, three-sixteenths to five-eighths of an inch; two pair steel clamps, 6 inches; one pair 3 inch

snip shears; one combination 3½ inch vise and anvil; one voltmeter for testing battery and connections; one tire repair outfit.

The above set of tools will cost from $30 to $35. A good supplement to this is a small forge and 9 inch swing screw cutting lathe. With the tools above enumerated and the forge and lathe one does not need to patronize the repair shops, but as very few automobilists understand the full use of such tools this list is only adapted to the use of those who are "handy" with machine tools.

A Year's Experience with a Gasoline Runabout in the Rocky Mountain Regions.

By Dr. T. E. Taylor.

For nearly two years I had been interested in the automobile; had taken The Horseless Age to get reliable and up to date information regarding it, having been especially interested in the "Business Automobiles" number of February 6, 1901, as well as having interviewed everyone I met who knew anything of this subject. At that time there were none in use here except a few steam wagons and two or three electrics. Neither of these seemed quite satisfactory, though praised more or less enthusiastically by their owners.

In connection with a visit to the Pan-American Exposition I had an opportunity to visit some factories where gasoline wagons were being turned out, and was much pleased with their working. I was surprised, however, to find that most of the men I talked with who had no especial interest either way, but who had some opportunities for reaching a correct judgment in the matter, favored the steam wagon. This did not convince me, but "gave me pause."

Soon after my return an agency was established in my city for a popular light runabout of the gasoline type, and I was so well pleased with its performance that I bought one. I soon found, however, that it was not quite all my fancy had painted it; and several times it would stop and no amount of coaxing or "cranking" would make it go. Always an expert from the shop could start it, and each time I learned something, so I looked forward hopefully to the time when I should be able always to make a quick and accurate diagnosis of the underlying cause of these attacks of "heart failure"—which anticipation has been realized in a good degree. Occasionally, though rarely, I fail to start it, but I can locate the difficulty, and it has been a long time since a man from the shop has succeeded in starting it when I had failed.

CAUSES OF TROUBLE.

In looking back over my experience I find that most of my troubles have come from (1) poor batteries, (2) cooling pipes, (3) a separate cylinder head and (4) a mixer which failed to furnish gasoline to the cylinder on starting in cold weather.

(1) The book of directions which came with my machine gave, among possible causes of the motor not igniting regularly—"Fifth—weak battery; but not likely unless used for four or five months." Of course I supposed that was authoritative, and so, when explosions failed or came irregularly, I looked for loose wire connections, cleaned the spark plug, and changed the adjustment of the buzzer, while never suspecting the real trouble, the poor batteries. Sometimes, indeed, I did suspect them, but a local electrician would test them with his voltmeter and report them all above one volt, making the voltage of the four cell battery five or six volts, which was supposed to be all right. Later I found out that the voltage is an utterly untrustworthy in ication of the working capacity of the batteries. After some eight months of battery troubles, trying different kinds of cells and finding some even worse than others, I was given the pointer that a small storage battery was the best operator of a spark coil. I had one put into my wagon at once at a cost of $15. I was promised that it would run my wagon 600 miles on one charge, but it does better than that and can be recharged in a few hours at a cost of 50 cents, making it much cheaper than batteries, and incomparably more satisfactory. Now, when I do not get an explosion, I look at the wiring, but have no fears for the battery.

Probably I should sooner have discovered the real source of my difficulty, if my suspicions had not been quieted by my guide book. It should have said: "If your explosions are weak or irregular, nine chances out of ten the trouble is in the batteries, even if they have not been in use two weeks."

GLYCERINE MIXTURES.

(2) It was late in the fall when I bought my wagon and anti-freeze mixtures soon became a live issue. One of the strong arguments with me in favor of the gasoline wagon as compared with the steam one had been that its water could be fixed so that it would not freeze. I accordingly soon got a mixture of glycerine and water with which I filled my tank, but, alas, I found that glycerine is hard to hold, and my pipes and connections had never been absolutely water tight. The escape of water had been trifling, but the glycerine mixture soon got out, leaving me with a hot cylinder and probably a burned gasket. After repeated endeavors to have my pipes made glycerine tight and losing several solutions, I gave up and tried a later favorite, —calcium chloride. This can be depended on not to freeze, if the solution is concentrated, but my pipes were apparently corroded by it, and it, too, escaped, leaving a white coating on springs and axle. I tried two or three solutions of this and finally, fearful of totally ruining my pipes, I refrained from use of my wagon on very cold days and only used clear water, drawing it off on coming in at night. I have since

A Denver Doctor's Auto Stable.

Tool Equipment of Auto Stable.

seen reports of tests showing that calcium chloride will not corrode most metals, including brass, which is the material of which my pipes are made, but I am not convinced.

THAT RUBBER GASKET.

(3) The head of my cylinder is a separate piece, the joint being made water tight by a rubber gasket. This is all right and will usually last a long time, if the water does not get exhausted, allowing the cylinder to get overheated. In this case the gasket is usually ruined, allowing a little of the cooling water to reach the explosion chamber, making it difficult or impossible to start the engine. Of course, this was generally due to carelessness, but most of us are careless sometimes and if the cylinder had been all in one piece there would have been no damage. I may say that I now have a gasket which is said to bear heat without injury, and twice since it was put in my cylinder has been so hot that the explosions continued after the spark was switched off, with no noticeable injury.

(4) My mixer usually acts very satisfactorily after the wagon is started, and it starts all right in warm weather, but in cold weather it leaves much to be desired. Under these circumstances it fails to draw in enough gasoline vapor to make an explosive mixture, and gasoline must be poured on the air screen or directly into the explosion chamber to make it start. This difficulty is said to be overcome in the latest models by a carburetor.

LESS THAN $5 FOR TIRES.

All that I had read, and especially the "Wheels and Tires" number of The Horseless Age, had led me to expect all kinds of trouble and expense with tires, so I was the more surprised and gratified by my experience. I have had three punctures up to date, which were perfectly cured by a tube of puncturine in each case, and one which required a plug. A gash through which a finger could be passed was vulcanized four months ago and is all right yet. One tire exploded one hot day last July and a new one was furnished me by the factory. I have spent less than $5 for tires in the year that I have used the wagon and my tires look good for six months more. Whether I am unusually careful about avoiding glass and other dangerous things or whether my wagon is fitted with "the only tire," or whether I have been lucky, I do not know. Probably all three factors deserve some credit.

EXPENSE ACCOUNT.

My wagon is said to run 35 or 40 miles on a gallon of gasoline, but I have only been able to run about 25 miles. My expense account runs from a minimum of $8 a month to a maximum of $42 last month, which includes a thorough overhauling, bushing and some new parts. One month the cost was $28, these being the only two months when the cost exceeded $20. I regret that I did not save all the bills so that I could give the exact cost for the year.

In conclusion, let me say that while it is far from perfect and does occasionally make me trouble—though less frequently, as I become better acquainted with its freaks—yet, as compared with a horse, I find it much more satisfactory, especially in a climate like ours, where there is so little mud or deep snow. An automobile can be operated under such circumstances, but it is not worth while. It has this advantage—when not in use it is not "eating its head off" or getting so frisky that it is dangerous to take it out.

What Class of Doctors Should Buy Automobiles and What Class Should Not.

By Dr. D. J. Macdonald.

In the first place, I want to congratulate The Horseless Age on its instructive, newsy and progressive spirit, and to compliment its editor for his fair and fearless treatment of this all important movement. I did not intend to "throw bouquets" when I concluded to add my little quota, but recollecting all the good, substantial knowledge I have derived from reading accounts of the mishaps of other unfortunates, the "Beginners Page," etc., I feel that most likely I have in a measure to thank your paper for my automobile career during the last summer and autumn. I own the only automobile in a Montana town of 14,000 inhabitants, and while I did not have the time to use it continually, yet every moment of recreation was spent in its use, including a few trips to other nearby towns of 60 mile runs, and while I am naturally of a cautious temperament, yet the miscellaneous matter in The Horseless Age has so tempered my handling of the machine that I feel very confident as to the future.

It is quite a problem for one person to attempt to educate the number of horses used both in a business and pleasurable way in and about town, yet I can truthfully say I have not caused a single runaway, and $10 would cover my repair bill. Of course, I do not claim anything wonderful for my record, and I know the majority of automobile users can probably say the same thing, but what I want to impress is "caution" or "precaution." I am sure if I had anything serious in the way of an accident I would not be offended to see it in the automobile magazines, in the hope that it might help another in avoiding it, and that is why I appreciate the independent spirit of The Horseless Age. We must all learn to a greater or lesser degree from the experience of one another.

The automobile problem being a broad subject, I will confine myself to automobiles for physicians in towns ranging from 20,000 to 75,000 population, and more or less distant from manufacturing and repair stations. I will divide the subject into three parts—viz.: Physicians who should not under any circumstances possess or attempt to run automobiles; second, physicians who, under certain conditions, might own and run one successfully; third, physicians who by all means should own and possess one.

Now, the introduction might at first thought appear to interested ones as a damper, or in slang parlance, a "knock," but I will attempt to prove the contrary.

In regard to the first division, the doctor who, by possessing an automobile, would be likely, in my estimation, to injure the movement, I have in mind the busy doctor, whose hobby (and they nearly all have a hobby) is books and along such lines, and who does not care for fishing or hunting or outdoor exercise, a man of æsthetic temperament, of faultless dress and mien, and who is utterly devoid of mechanical ability. Of course, some may say no such men exist, but I know personally two, and I assure you no more clever and capable men reside in this district, yet neither one can fix his front gate or hang his screen door successfully, cannot fix his operating table if it only needs a screw, or if he were caught out in the country with a defective hypodermic, which could be made useful by a new leather packing, would simply have to either do without or go back to town and buy one. Such a man had better let the auto alone, or he will do just what Mr. H——, of Butte, did—he will start out, after, of course, imbibing all the knowledge the accompanying directions afford, and will go possibly a few miles, when something happens. He stops the machine, if he can, or if it has not already stopped, and with a nice white vest and dainty tan gloves commences his inspection of the machine. He soon has an immense crowd about to annoy him with senseless questions and suggestions, among them the man who never fails to say: "The horse suits me all right—you had better hitch a horse to it, Doc.," etc. Doc. by this time has his white vest sadly soiled, as well as his gloves and hat, and his temper pretty much ruffled, and he beckons one of the express wagons and has it hauled home, and after a few remarks unfit for publication and very unbecoming an æsthetic gentleman, he accepts the kind invitation of a friend to ride home in a horse carriage. Now, I cannot dwell on whether the doctor was on his way to make an urgent call or whether he did not find after changing his apparel and putting himself in presentable condition that he was just so long answering the call that Dr. B—— met him returning after making the call, but we hope he used better judgment.

This picture may seem overdrawn, but I tell you I know this very thing, or practically the same, to have occurred three different times to a gentleman in a neighboring town last summer, and the last time he had the machine out, which was the third, he had it hauled to a scrap pile near his home, and I tell you candidly it would take a mighty good salesman a great deal

of time and demonstrating with a faultless acting machine to induce many sales at his place. Now all this is most unfortunate, but true, and while I hate to discourage intending purchasers, yet I would say to them to consider this from the most favorable light, and remember it implies caution, and only applies to a very small portion or percentage.

As to the second division, "Physicians, who under certain conditions should have an automobile," I will endeavor to be brief. In the first place, the doctor must be fairly well to do, and must retain his former vehicle for months after getting his machine. He must be something of a "handy man." I mean by that he must be able to do the little fixing about his office and home which the previously depicted doctor failed to accomplish, and not be afraid to put on a pair of overalls and jumper and get on his back and pack his water pumps, or stuffing boxes, and oil it properly, and all the other things necessary to keep the machine in good order.

Now I do not want the readers to forget that I am writing on this subject with relation to the doctor in the smaller towns, who has not a host of menials at his beck and call, and where there are no auto liveries, or where, if you are out with your machine and it breaks down, there are no street cars going in all directions every few minutes, and no repair stations with experts to fix up the breaks, and keep them fixed.

As I said before, this doctor may, with attention, run his machine successfully, but he must begin right. He ought to go to some nearby city, where he can find a variety of machines, and make up his mind to spend a month or two in practical study of electric, gasoline and steam machines. The time spent depends on his ability and time to spare. After becoming more or less familiar with the different motive powers, he must select the one best suited to his locality, and in his judgment the best for him. It is well to listen to all the arguments advanced by the respective agents, but to keep his own counsel and not decide hurriedly on any one man's advice, as they can all show you very cleverly how many good points there are to their respective machines and how much trouble you will have with some other make. Automobile agents are very much like insurance agents—each can show you a very redeeming feature about his goods none of the others possess, but fail to show you that possibly one feature is just as much below the other proportionately. In fact, they all sum up pretty much alike. Of course some are preferable to others, and if everyone bought the best, there would be but one firm selling machines, and that would not do at all.

Now after feeling confident he can consistently run his machine, the next thing is to knock it down preparatory to shipping, and he must superintend, or at least assist, in that very important part, so that when he returns home, and in due time his machine arrives, he can intelligently put it together and start it without having to guess at anything, as most likely no one will understand it, and he must rely upon himself. Then he must devote considerable of his leisure time to running it, and must have a good sized tool box with many extra parts, necessary tools, etc., so that he can put a few links into a broken chain, etc., if he has an accident some distance from town. He must not attempt to use it in a business way for some time, but more for recreation until he completely masters it, and then he can with considerable safety dispense with his horse, if he feels inclined.

Of course, it is not my object to attempt to tell how to run a machine, but as to whom in my estimation should possess one, so I will pass to the third division, or the doctor who by all means should possess a machine. Either one of two requisites is sufficient in this classification, viz., the doctor with ample means to provide himself with a chauffeur, or the natural born mechanic who takes much pleasure in handling and investigating ingenious mechanism. The doctor, as we all know, meets with considerable nerve wrecking experiences in the practice of his profession, and I can think of nothing so interesting or so all absorbing as the auto. When a doctor dons his overalls and jumper and crawls under the machine from two or three to a dozen times, oiling, cleaning and repairing, and doing all the preparatory work to taking a spin, he will need no other gymnastic exercise for the day, and while out for his airing he must necessarily keep his mind to a considerable extent on the handling and propulsion of his vehicle, so that when he comes in for the day you may be sure he is both ready to eat and sleep. That in itself is no mean accomplishment, you must admit. The caretaking and repairing of an auto necessitate considerable open air exercise, and there is where the man of mechanical tendencies gets the better of the man with the chauffeur.

Of course, the pleasure and use, especially the use that the man with the chauffeur derives from his auto, is not in any sense a mean one, particularly after a hard, long day of professional service, and feeling very tired it is quite enjoyable to call Mr. Chauffeur and take a spin over the country with mind at rest and care free.

The Pacific Coast.

Facts from Oregon.

By Dr. E. M. Dallas.

When first I thought of buying an automobile, in the summer of 1900, there was in operation in Portland, a city of 90,000 population, one small steam carriage, and that mostly built by a local genius. This machine was intended to travel at the rate of 12 miles an hour, more or less, and the few times I saw it in operation it acted like a bucking mule, and was altogether a most unsatisfactory affair; in fact, the last time I saw it the owner was sailing down the street enveloped in a cloud of steam which hid both him and the carriage for a whole block. Evidently this was not the kind of automobile I wanted, so I wrote to all the Eastern houses whose address I could find for further information on the subject. When I received the catalogues I found it more difficult than ever to make my choice. Finally a local firm took the agency for a well known make of steamer, and after several trials on hills, in mud and over very rough roads, I felt that this machine could do the work of a pair of horses, and invested $1,000 in the first automobile of its kind sold in the Pacific Northwest.

For several days after my purchase the roads were very muddy and I found great difficulty in steering my machine in a straight line for any great distance, and one day I explained my trouble to the agent. This gentleman informed me that I was not on to the "modus operandi" of the steering lever, and then he proceeded to take me out for a spin just to show me how easy it could be done when you knew how.

We had gone about two blocks when he tried to stop and turn around on a wet asphalt street, and the consequence of this move was that we kept on going in the same direction for about twenty yards, and came to an abrupt stop between a large telegraph post and a high curb. The engines were not damaged and we were able to get back to the machine shop without the help of a team. On closer inspection we found that the entire running gear had to be remodeled, as nearly every joint and reach were bent and three of the wheels had to be trued up, some of them having a dozen or more spokes knocked out. It took about two months before I had the pleasure of grasping the lever once more, but as it commenced to rain shortly after the accident and kept on doing so for the following eight weeks, I gave them all the time they wanted in order to have a good job.

NEW TROUBLES.

The first of my new troubles was lack of air for the fuel tanks, a very important

item in the successful running of a steam auto. The most I could get out of my pump was 20 pounds, which is far too little to force the fuel into the burner in good shape; and, of course, low pressure meant little steam. My pump is attached to the crosshead of the engine and works continually, but that fact did not seem to make any difference; I could only raise about 75 pounds of steam and crawl along at the rate of 5 miles an hour. I had the rubber hose taken off that leads from the pump to the check valve in the tank pipe, and a new one fitted in its place and cleaned all the connections; that helped a little for a few days, when the air was down again.

This time I had a new plunger put in the pump, but still I got no air. In fact, the air question got to be such a serious proposition that most of my rides lost their pleasure on account of it. One day I got desperate and went to work myself. I took the whole pump apart, when I discovered that in the check valve seat there was a rubber washer, and as soon as any gasoline came in contact with it the rubber swelled, closing the passage in the pipe and preventing air from getting to the tanks. I immediately had a ground joint valve put in its place, with the result that I had all the air I could use and had to lower the plunger on the air pump in order to keep the gauge below 75 pounds pressure.

This, then, was my first lesson, and from that day until this I have found that it is the small things that cause the worry and loss of time, for the big defects will nearly always explain themselves. My experience so far has taught me two things: First, that the manufacturers themselves do not always use judgment in the selection of their materials; second, when you find faulty construction the best way is to correct it as soon as possible. I might add that if you are at all mechanically inclined you should try to remedy the difficulty yourself; nine times out of ten you will do better than by placing your machine in the hands of an amateur machinist.

ROAD EXPERIENCES.

I had a rather amusing experience one evening, which proves how careful the driver of an auto should be about taking anyone's word that everything is O. K., that you have plenty of oil, tanks full, all the water you can use, enough gasoline, etc. I 'phoned over to the stables and told them to have my machine ready at a certain hour, and when I got there, as I was in a hurry, I took the caretaker's word that everything was full. I then called for the young lady who was to accompany me on her first ride in a horseless carriage. Everything went very nicely for the first 10 miles out, when it commenced to rain and we decided to turn toward home. It was getting late (about 10 o'clock) and as the rain began to come down in earnest I tucked the big waterproof robe around us and settled down for a quick run to town. We had gone about a mile when the water in the glass began to go down, and, although the by-pass was closed tight and the pump working in fine shape, the water kept falling. I knew at once that something was wrong, and got out to see if the water in my tank was all right. Putting my hand down in the tank, I struck bottom, but no water, and saw right away that the tanks had not been filled before starting.

Now, Oregon is not like the Eastern States, where you can find a farmhouse every half mile, and when I saw the fix we were in my heart began to settle in my boots. However, I said nothing to my partner, who sat in blissful ignorance by my side. Just as the water disappeared in the glass I saw the tall chimney of a house loom out of the night fog, and felt that I was saved. I found that the people were not at home and all the gates nailed up. Just one thing had to be done, and that was to climb the fence, and after ten minutes' walk I found the well, about four blocks from the road. It was about 75 feet deep and worked by two small buckets, each holding about 4 quarts, but leaking so badly that by the time I reached the fence and handed them over they were half empty. I made about twenty trips, the young lady helping to get the water to the machine, and after finishing she and I looked like a couple of tramps out in a rain storm. After filling the boiler by hand I started to fire up, but as the water was very cold it was with difficulty that I raised 100 pounds of steam. When I finally got under way we felt about half frozen, but when the water in the tank began to get warm the hot air from under the seat made us feel comfortable.

We arrived home that night—or I should say morning—at 2:30. It is hardly necessary for me to say that I received no more invitations from that particular family, and a chilly blast greets me instead of the genial old smile; and all this from the want of a little forethought. Moral: Look to the water tank.

FAULTY CONSTRUCTION.

All through that summer my machine behaved remarkably well, especially for our rough Oregon roads, but I was never quite satisfied with the water consumption. I could carry 32 gallons, which the makers said would be sufficient under ordinary conditions for a run of 30 miles, but the best I could do, starting out with full tank and boiler, was about 20.

When our rainy season commenced I took my machine to a builder of engines and boilers who, after several trials on steep hills, told me that there was a loss of steam through the exhaust, equal to one-third of my power; and as he said he could remedy the trouble at a small expense, I had him go to work and take the engine apart. On taking the steam valves apart we found that there were no rings in either of the heads, although the cuts in the catalogue showed them very plainly, and there was enough room between the walls of the steam chamber and the piston for a layer of writing paper.

After the rings were put in my fuel bill dropped 20 per cent. and a gallon of water carried me a mile over a fair road; and when the roads were good a full tank would last for a run of 36 to 40 miles. And, by the way, that bill was only $35, including a new sight feed for the cylinders and all the wear and slack taken up on an engine that had run over 2,000 miles. This machinist has taken care of my auto ever since, and his charges are very reasonable, because he knows just what has to be done, and goes to work and does it.

I have never failed to get home on my own power with my steamer, which says a good deal for that type of machine, this being my third season with it. The tires are single tube and have given me little trouble. I have had more than my share of punctures, but they were all easily fixed and seldom leaked after being repaired.

BLUNDERS IN OPERATING.

Many good jokes could be told by amateur operators of their first few weeks' experience, but as the laugh is always on themselves their fellow men hear little of what has taken place. About a week after I was put in full charge of my rig I was sailing along at a good rate, when a rather high strung horse driven by a timid girl began prancing in front of me, and I had to apply the brakes in a hurry. After they had passed in safety I commenced to make up for lost time, to come up with the others who were by this time a mile ahead. But the very best I could do was a 3 mile gait. Steam began to go down, and after thinking of all things that could possibly account for this trouble the party riding with me suggested that I take off the brake and see if that would not mend matters. When I saw that I had been trying to break the record with the brake hard set you may be sure I felt cheap, especially to be told so by one who had never been out in an auto before that trip.

One day I commenced to fire up with the throttle away forward, although at the time I was not aware of the fact. Having occasion to go back in the rear of the stables I left the machine all alone, and when returning a few moments later the stall was empty and no auto in sight. On investigating I found that as the steam had risen the machine had gradually crept out of the stable, crossed the road in safety and wound up at the curb on the other side. Luckily I came out in time to prevent it from smashing into a large window about 5 feet away.

INTERNAL RUST.

The water problem is an important item in the running of a steam rig, especially in parts of the country where the water is limey, and I think that every manufacturer should give instructions on this subject. The people I purchased my machine of said nothing whatever in regard to the

action of water in boilers, with the result that in a very short time my lower water tubes began to leak. Taking the machine to my mechanic, he declared I had burned out the boiler, but as I was positive that it had never been allowed to run dry, he was at a loss to account for the leak. On taking out the tubes he found that internal rust was responsible for the damage, and while our water is considered exceptionally pure for all domestic purposes, I found on inquiry at the different machine shops that a compound had to be used in all boilers using city water. A hole was bored in the boiler and a plug inserted containing a piece of zinc, which has been very satisfactory, and the rust seems to have disappeared, but I am careful to have the boiler blown out at least twice a week.

COST OF OPERATING.

One of the most important questions regarding automobiles is the cost of running and keeping in repair, and after three years' experience I am in a fair way able to give an idea of what this will amount to with steamers. Fuel out here costs about 25 cents a gallon, buying it, as I have to, in 10 gallon cans (on account of insurance). The stable rent amounts to $4 per month, a very small sum in comparison with some figures published lately in The Horseless Age. I attend to some of the cleaning myself, with the assistance of a man to do the dirty work, but what I paid him is not included in the following estimate, as I pay him no stated amount.

When I bought my machine I was told that the expense of running would be in the neighborhood of 10 cents a mile, including repairs, but my account against the auto is exactly $100 per 1,000 miles. This average extends over a period of three seasons and comes out the same each year, so that I am positive the cost per mile is about 20 cents. I am considered a careful driver, always take the road that saves the machine, never force my engines and save fuel whenever I can.

In conclusion, let me say for the steam rig that there is no great trouble in locating any difficulty, and that I find a certain satisfaction in having something to watch during the run. Then, on cold nights, the warm air from under the boiler comes in mighty handy, as all one has to do is to lift the flap under the seat to get all the hot air you want, and, with a large driving robe well tucked around you, you can defy the stormy weather and feel sorry for the man in the gasoline machine. Of course, motor driven autos have their peculiar troubles, and the only thing that interferes with the perfect running of them is the inability of the operator to find out what the matter is when they stop.

A California Physician's Experience.

By Dr. D. A. Staples.

My first experience was with a gasoline machine. For two months I studied and examined all the automobiles exhibited at the World's Fair in Paris, in 1900, and after that I knew as much as before. Every manufacturer claimed that his machines were the best, pointed out the defects of his neighbors', and these when spoken to about the supposed defects claimed that just in these points lay the superiority of their machines. Some machines were too light and underpowered, and the really good ones had hot tube ignition. Besides, the manufacturers were overcrowded with

A California Doctor Taking His Family for a Pleasure Ride.

orders and I did not want to wait twelve to eighteen months. So I bought a 6 horse power Hurtu, of the Benz type. I went to the factory every day to learn as much as possible about the machine, and when three months later it was finally delivered to me, I undertook the next day the long trip from Paris to Vienna, over the Jura Mountains, visiting the most important places in Switzerland, South Germany and the Salzkammergut in Austria. With three persons and luggage the auto weighed 1,000 kilograms.

I soon realized that I had a beautiful car, but a bad machine. The transmission was by belts, and when I needed them the most, over steep hills, they were too loose. Over the steep mountains in Switzerland, Germany, and principally in Austria, we were compelled not only to step out and to push very hard, but sometimes indeed to hire a horse. The next trouble I had was with the carburetor, which had either too much or too little gasoline. The ignition—strange to say—never gave trouble; during the thirty-four days of travel the storage battery was replaced only once by one which I carried in reserve. Sometimes I could turn the crank for half an hour before getting the motor started, and sometimes two turns were sufficient. The mixture was seldom right and I had the most trouble in the mountains, where the scenery was most beautiful. It was often more work than pleasure. One year later I sold my machine and was glad of it.

Here in San Francisco, with its steep hills and bad pavements, I saw that only a steam automobile could give satisfaction. The noiselessness and the excellent hill climbing qualities of the steamers pleased me greatly. After careful examination one machine seemed to me the most reasonably constructed, in that it had no water glass to watch. I wanted only a condenser on and a tonneau. The agent tried to convince me that it was impossible to put on a condenser (I knew the Serpollet had a condenser), and that it was also impossible to build a tonneau. I resisted my automania several months, but in the end bought the machine (June, 1902) without condenser and tonneau. The latter, however, I had built by a local carriage builder, who also put on a canopy top and glass in front. The canopy slides back and with the curtains it affords better protection against the rain than any ordinary top.

But automobiles are like women—you know them only after you possess them. I found that riding over rough roads is not at all a pleasure. The springs were too short and too weak. I made them stronger and put springs in the cushions. But only since I put on wooden wheels is the riding easier and more similar to that of my French auto. These wooden wheels also made the rig look better. Then I discovered many things not only against every mechanical principle, but also against common sense. The lubrication, for instance, is faulty, as to inject grease one must assume the most tortuous positions. And how to put new packing in the stuffing boxes without nearly breaking the spine is still a puzzle to me. If the pilot light is stopped up I can easily clean it, but I need a tank with compressed air to test whether it is not leaking, or it costs me two and a half dollars to have it repaired. Would it not be better and cheaper to make this pilot light in such a way that when dirty it may be thrown away and for a few cents a new one put in? The main ball bearings were breaking all the time, and I recently replaced them with plain bearings. An inconvenience I complain of every second or third day, when I have to put in fresh gasoline, is that the gasoline is kept under pressure. It is a loss of time and hard pumping work to refill the tank. Despite these defects I am always delighted when I run over the steepest hills with almost unreduced speed. I have not yet found a hill too steep for my machine, and oftentimes I wish I had had this machine on my European trip. With my gasoline machine I could never be in time at an appointment, whereas the steamer is entirely reliable, an important item to a physician. The noiselessness and the lack of unpleasant vibration are advantages to be taken in consideration. Finally it is a difficult task to drive a gasoline machine in crowded streets or over roads full of holes.

The American manufacturer of gasoline machines learned and still learns much from the French; why do the steam automobile manufacturers not learn from them?

Abolish the buggy form and adopt the tonneau instead; use a substantially built enclosed engine, perhaps without stuffing boxes; place it in front in a manner that all parts can be easily inspected or replaced; do away with pilot lights and vaporizers which require many hours and a workshop to repair—and we will soon have a steam machine which for a physician is superior to a gasoline machine.

One and a Half Years' Experience with a Steam Machine in California.

BY LEVI D. JOHNSON, M. D.

For many years I had believed that a horseless carriage would become a practical thing. My impression had been that gasoline would be the most practical power to use until a storage battery could become so perfected as to make electricity practical. I had practically decided to buy some make of gasoline carriage, when I talked with a friend, who had first had a steam carriage, sold that, bought a gasoline one, become tired of that and bought a steam machine again, and who advised me to do likewise. So on July 1, 1901, I purchased a steam carriage which, of course, I thought was the best make of any. I had a few lessons in regard to handling the machine, and was told that I could use it admirably. It was shipped to me and I began its use.

BURNED THE BOILER.

For a time I had no trouble and was very much pleased with it. I began to see, however, in studying its various parts, that there were things about it which were liable at almost any time to give me trouble. One of the first things I observed was that the pipes leading into and from the boiler were too small, being one-eighth of an inch. It seemed to me that with the utmost care those pipes were liable to choke up and interfere with the free circulation of the water through the water glass and deceive me in regard to the amount of water which I had in my boiler. I very soon found that this was true. I had been out making some calls one morning, and when I came home my son, who had been using the machine some and could handle it all right, wanted to go for a little drive. He went out a mile or two and found that his steam was running down. The glass was nearly full of water, but the steam continued to go down. Not knowing what was the trouble, he got off and found that the boiler and burner were red hot and, of course, the boiler was badly burned. In fact, it was so badly burned that I had to have new tubes put in all around. I then discovered that one of the tubes had become filled up, not allowing the water to circulate through the water glass.

IMPROVEMENTS MADE.

After that experience I took out the check valve in the pipe leading from the top of the boiler to the upper part of the water glass and put in a steam valve to take its place, and also put in another steam valve in the pipe at the lower end of the water glass leading to the boiler. In opening the lower valve and allowing the water and steam to blow off I could be sure that my pipe was open from the upper part of the boiler down through the water glass, and by placing the valve above the water glass and leaving the lower valve open I could know that the pipe from the boiler was clear. I had on a low water alarm, but in some way the pipes from this had also become filled, so that it did not give the alarm at the time the boiler was burned out. To overcome this trouble I put in a valve above the alarm, with the handle extending through the side of the carriage body, and by opening and closing this when I was blowing out through the valves just described I could be certain as to whether the water alarm was in working order.

PIPES CHOKING WITH SEDIMENT.

Everything went all right in this line for a time, when I discovered that it was almost impossible for me to keep water enough in the boiler with my crosshead pump, and, upon examination, I found that the pipe leading from the pump to the boiler was almost closed up with sedi-

ment. I cleaned the pipe out thoroughly and then put in a valve just at the angle of the pipe from the pump leading into the boiler, acting as a blow-off. Now my two blow-off valves are opposite each other and I can make certain at any time that all my pipes are free and open. Whenever I run the machine 12 miles or more I always blow out the boiler, when I come in, through both these valves, and I think the trouble in this direction has come to an end, as I have been using it this way without trouble for several months.

WATER GLASSES BREAKING.

Another trouble which I experienced was with the water glass. I had used the machine for several months without breaking a glass, and one day when riding along on a smooth road the glass broke. It was soon replaced by another. This one lasted perhaps four or five weeks, when another broke, and another in about an hour. I happened to be near an automobile repair shop, and called there, and was told that the kind of glass which I was using was no good, but that they had some glasses which would last for months. I had them put one in. I had gone about half a mile and stopped to go in a house for a few minutes, when, while I was in, the glass broke. Another one bought from them was inserted, and broke before I got back to the shop. They put in another, working on it for some time, and it broke before I got home. The next morning two others broke and then I found that the lock nuts holding the cups in which the ends of the glass were inserted were loose, allowing a little play, and thus bringing a twist upon the glass. These were tightened up and a new glass put in, lasting, I think, two months or a little more, but it was only a short time after that, until, in spite of all the adjustment and alignment which I could make, the glass again began to break. I think I used something over two dozen glasses. I then put on a Reliable water glass, made in St. Louis, and from that time until the present have had no more trouble.

My fire was started by heating a torch and inserting it under the boiler, raising the steam to 20 or 30 pounds, and then turning on the main burner and removing the torch. The directions furnished with the machine directed me to heat the torch in a cook stove. Anyone who has had this experience knows it is not a very convenient or reliable way of doing. I tried various ways of heating the torch and at last was told of a very simple manner of doing it by Mr. Moran, of Louisville, Ky. I have continued to do this until the present time. Mr. Moran was very kind in writing me full directions as to how to make a little device, and shape the torch in such a way as to hold a little copper trough, filled with asbestos and saturated with gasoline, and firing this to heat the torch. It is very easily made and is certainly a matter of great convenience.

ADDS A PILOT LIGHT.

I had considerable trouble with back firing and with the fire blowing out when the steam was up, and the diaphragm regulator had cut down the flame to a minimum. I felt the need of having some arrangement for a pilot light which would constantly burn, so as to obviate this difficulty, as it was an unpleasant matter in riding along the road to have the fire go out and have to get out and take a match to relight it. I saw an attachment made for this purpose that was sold for the small amount of $20. It seemed to me that the device could be made to sell for $1.50 with a profit. I soon found that the torch which they were using for this purpose was made by Turner Brothers, in Chicago, and was a part of their pocket gasoline torch, which sells for about $1.50, I believe, complete. I sent and got the torch, took the burner off and fixed one onto my machine on the same principle as the one sold for $20, and mine cost only about $2.50. This worked all right for a time, but the principle upon which it was made did not provide for cleaning out the small, delicate holes through which the gasoline vapor passed, and it soon clogged up, and I found it was quite a difficult matter to keep it cleaned out so it would work reliably. I then took the upper part of a regular plumber's or painter's torch, and attached it in the same way as I had had the little torch above described. This was larger and the valve was arranged in such a way that it would keep the hole open or clear from clogging as did the other. I also found that I could use this to generate gas or heat the tubes in the first place, so I could steam up without using the torch provided by the manufacturers, although it did not act quite as quickly and well; but as a pilot light it acts all right.

BACK FIRING REMEDIED.

To overcome back firing I had the flue on the top of the tank made longer, extending almost to the edge of the carriage, and about 1 inch from the end of the tube I had a plate of sheet iron, as large as the flue, fixed to the end of the stack in such a way that the wind could not blow directly into the smokestack and down into the burner. This is a very simple device and one which has proven very effective. I do not remember having the burner back fire a single time since I put on this device.

It was not long after I had begun using the carriage until I was satisfied that the arrangement for holding the reverse lever was not as secure as it should be. However, I went along using it and was assured by those who were selling the machine that it was all right and that I would never have any trouble. The machine also had a single acting brake, or one which only held the machine when going forward. I was also afraid of this and had decided to put on a double acting brake, but had neglected to do so from day to day. With these two weak spots in my machine I came very near losing my life, and certainly wrecked the machine pretty badly.

AN INSTRUCTIVE ACCIDENT.

I was called out to see a patient early one morning and was going up a very moderate grade, not nearly as steep as I had been up many times before and since without any trouble, when suddenly my reverse lever reversed. The machine, of course, stopped for an instant, and without thinking what had happened, I opened the throttle valve still wider, and this gave the machine a tremendous impetus backward, down the grade. I at once applied my foot to the brake, but it had very little effect in checking it with the single acting brake, and after it had gone about two rods down grade and going out of the road, one of the hind wheels dropped into a hole almost to the axle, and as it was going with such force and rapidity down grade the machine turned over backwards. I have no remembrance whatever of striking the ground, and could not have told whether I struck on my head, back or feet when I lit. It did not hurt me a particle, and I was on my feet in an instant to see what had become of the machine and to extinguish the fire. I afterward inquired of a man who saw the accident and he told me I lit on my shoulders, turning a complete somersault, and was instantly upon my feet. The machine was wrecked pretty badly, but I was very thankful to escape with my life and unhurt. I call attention to this accident for this reason: These machines are built and sent out to be used by persons who, in a very large majority of cases, have never had any experience with such machines, and who have very little mechanical ingenuity or adaptability. They are assured that the machine has been perfected so that it is simple to work and safe to handle. I believe that any party who knows enough to build a machine ought to know that a brake like that and a reverse lever which can reverse itself as that did are exceedingly unsafe. I at once devised a very simple means by which the reverse lever is absolutely held in place, and cannot move without loosening a ratchet fitting closely into a deep notch, and also had a double acting brake put on which holds the machine in going backward as well as forward.

There ought to be some more simple device than I have ever seen for starting a fire quickly, and without so much trouble as by using the torch. I have seen such a device advertised, but have not as yet had an opportunity of trying it. If it is what it is claimed to be it certainly will be a great boon to those using steam machines.

I have never had any particular experience with a gasoline motor, but feel that I would like to do so.

PLEASED WITH ITS WORKING.

While I have had experiences with my wagon which have been far from pleasur-

able, yet, taken altogether, I have been very much pleased with its workings. I use it altogether in my practice, day and night, having disposed of my horses and buggies after I had learned how to operate it satisfactorily.

The roads here in Southern California are mostly good, fairly level, and one has no reason for finding fault in that direction. Another thing which is a great advantage over the East is that we never have weather cold enough to freeze up the machines. They are always ready in that respect. It takes me about ten minutes from the time that I start to get ready to go. I have done it in less time.

I believe that there are several very simple and yet important improvements which can be made which will wonderfully simplify the use of the horseless carriage, making it easier to handle and safer in its use. I would be very sorry indeed to have to go back to the use of horses and buggies, although I have been and am a great lover of good horses.

I would be glad to have some reports through your columns in regard to the experiences of those using larger wheels than those ordinarily used on automobiles. My wheels are 28 inch. I can see no objection to their being at least 32 or 34 inch. If anyone has tried the larger wheel and finds that it is an objection I would be glad to know it, as I am expecting to build a carriage for my own use and want to combine all the best points.

A Busy Doctor's Experience in the Santa Clara Valley, California.

By Chas. A. Wayland, M. D.

Having read with much interest from time to time the automobile experiences of others, as related in your interesting magazine, and being the owner of two machines of well known types (one steam and the other gasoline), I thought others, too, might be interested and benefited by my experiences.

Having kept from five to seven horses, dead on their feet, so to speak, most of the time, I am one who would naturally look to some other means of locomotion aside from the poor old tired horse, and hailed with joy the first approach of the auto as a solution of the problem.

My ideas of the auto were not unlike many others—an inanimate machine with unreasonable fortitude and endurance—capable of running from 30 to 40 miles per hour at any time, and anywhere, with very little attention.

As the Santa Clara Valley (Central California) is blessed with fine level roads, with very little mud, winter or summer, it should be an ideal place to make a success of the automobile.

About two years ago a friend kindly tendered his services and steam machine, that he had run nearly 10,000 miles, to demonstrate that the automobile would be just the thing for my business. It ran very smoothly, yet he assured me that I would have some trouble, but not enough to arouse any fears. Consequently, I placed an order for a similar machine, as everyone with whom I talked on the subject seemed to favor steam as the only reliable power. My machine did not arrive until July 1, 1901.

THE NEW STEAMER ARRIVES.

My friend took it to his residence in the country for a fortnight to break it in; he also took my coachman to break him in, but being a young man, who took very little interest in mechanics, he did not catch on very readily. He could run the machine as long as everything kept its equilibrium, but finally he got so he fairly hated the sight of it.

A description of the automobile and the location of its parts may be of interest to the reader. The material that went into its construction and the workmanship seemed to be of the very best, but, in my mind, the design was faulty in a few points, as it took about two hours of hard work with a monkey wrench to get at the stuffing glands on the engines. Any mechanic can see that this is a poor design.

The running gear is the best part of the rig. It is composed of drop forgings and steel tubing, constructed and braced in such a way as to allow perfect flexibility, and which will permit any wheel to take a vertical motion without straining or twisting the reaches.

PUMP AND LUBRICATOR DIFFICULTIES.

Accompanied by my coachman, we ventured out one morning, confident we could manage the machine, as we had everything seemingly in good order, tanks being filled and the lubricators properly looked after.

I had been warned never to let the water get low in the boiler. Everything ran smoothly for 2 or 3 miles, when we noticed the water kept gradually going down in the boiler.

I kept twisting the wheel, closing the bypass, but to no avail. The water went down out of sight in spite of our anxiety.

I knew that would not do, so we called a halt to investigate. We examined the water tank to see if the water supply was exhausted, but we found it was more than half full, as we had not gone over 8 miles. Having just returned from a ten days vacation, there seemingly was no end of work stacked up in front of me. I had never been delayed with horses and as I had always made it a point to "get there" when a call came, I looked upon a delay with horror. My assistant had been shown how to operate the injector and with considerable delay it took water. The boiler was again filled to nearly the top of the glass, but the steam being so low we were compelled to wait three or four minutes more, which seemed like an hour to me. At last we proceeded on our route, stopping occasionally to refill the boiler and tank.

We ran the rig for a few days, but the pump became so that it would not work at all and we had to depend entirely on the injector; but that cut the steam down so fast that we could not make over 5 or 6 miles per hour at times. The automatic lubricator would not work, either; we could not get a tablespoonful of oil through it in a week with both valves wide open. For two months we ran the machine two or three days out of a week, while the rest of the time I had it in the shops, trying to mend the pump and lubricator—which cost over $30—but to no avail, as the mechanics who worked on it did not seem to understand why they did not operate.

The injector wasted a great deal of water, so we had to tank up every 4 or 5 miles, sometimes oftener; consequently our machine soon attained the name of "water wagon." My assistant watched the water gauge and operated the injector, while I attended to the steering. One morning a streak of dust on the gauge glass deceived him and the boiler went dry and we stopped.

The hand pump was worked vigorously, but the water ran out faster through the fire box than it could be forced in, and we had to abandon our schooner about 5 miles from home. If I could have gotten out half what I had put into it I would have forsaken the auto as

A "BITTER PILL,"

but I knew with the reputation that it had acquired it would be no easy task to get rid of it, and I tried to console myself with the fact that others, too, were having their share of perplexities. One thing I was certain of, it was a more progressive mode of traveling, and I thought I might just as well share in the developing of the art with the poor manufacturer, who gets all the—"blessings." After a time a friend came along with a buggy and kindly consented to take us home. An expressman was sent with a "hay motor" to tow in our "water wagon" to a shop for repairs. The boiler was repaired and everything put in order, except the pump and lubricator, which were a mystery to them.

I still had four head of horses, but they were not sufficient to do all my work, so I was compelled to use the auto to eke out for another month, yet at times it would leak so badly we would have to almost abandon it.

A FRIEND IN NEED.

One day I was called to the home of a young mechanic who was interested in automobiles and who had had much experience with both gas and steam eng[illegible] I told him about my troubles and [illegible] him if he could help me out of my "d[illegible] ma." He said he would not promise [illegible] much, but was confident he could ma[illegible] pump that would work if that one co[illegible] not be properly adjusted. I decided to make one more desperate effort to make it practical for my forenoon calls, so I

made arrangements for him to stay with me for a month or two, instructing him not to spare any time or expense to put the machine in shape to run as it should. He took it all to pieces and cleaned it up, tightening all the bolts and joints that were loose, and changed the lubricator pipes which inclined upward toward the lubricator instead of downward, so that all the steam that condensed in both pipes ran back into the cylinder instead of running into the lubricator to displace the oil and force it out by gravity. I am glad to say it never failed to work after that change.

AN OBSTINATE PUMP.

A few changes were made in the pump, but we still could not get a drop of water into the boiler, although it would throw water nearly 20 feet out through the priming cock, which was put onto the feed pipe between the pump and boiler.

New valves were put in, also reliefs to prevent air from collecting in the compression space of the pump, yet our efforts were unsuccessful. We knew that there was a "culprit" somewhere, for there is no such thing as chance when it comes to the laws of philosophy. The pump was now disconnected and filled with melted babbitt and bored out in such a way that no air could collect in it. We felt so sure that it would go now that everything was made ready, and accompanied by a lady friend, who was interested in automobiles, we started out on my route, which covered a radius of about 35 miles.

It was an ideal morning, and all nature seemed to rejoice; but after we had run about two miles our spirits began to sink with the water in the gauge. We began to think that in spite of the laws of nature some evil spirit had taken possession of that vexatious little piece of mechanism. My mechanic was still determined to find the cause of the failure, being encouraged by the fact that as it took more time for the water to lower in the gauge it was showing faint signs of working.

We had to resort, as usual, to the injector, notwithstanding our embarrassment, but our passenger soon became accustomed to the unpleasant features of the auto—the smell of oil and gasoline and sputtering and hissing of steam. However, these inconveniences were almost forgotten at times as we glided so smoothly over the beautiful country roads, lined with an everchanging variety of trees and shrubbery.

We had considerable sport with the old machine. Our courage increased a little as we knew the pump was doing some work, but not enough for practical purposes.

As high speed is detrimental to the working of a plunger pump—ours ran over 800 on high speed—we decided to put springs in over the valves, so as to prevent them from opening very far, and also hasten their closing. After that we had no more pump troubles, except the loosening of one spring, which was speedily rewired.

We got so we could depend so thoroughly on the pump that when our water tank went dry we could run nearly a mile after the water left the gauge glass before we would tank up again, and then run one-half mile before the water would come back in sight. In another half mile it would be at the top of the glass.

One-fourth of a turn on the pump wheel was sufficient to keep the water at a constant level in the boiler.

It was a blessing that the pump did not give us any more trouble, for we had our share without it. I began to think my experience would be like a writer in these columns who said that he had broken everything on his machine at some time or another except the flywheel; my rig being steam, was minus the flywheel, but had counter weights which gave us considerable trouble, as you will see later on.

Things moved smoothly for a few days, and we enjoyed to the utmost the pleasure of motoring; as we had been used to working our passage, we were now in a position to appreciate it.

A CONFLAGRATION.

About a week after it began to rain, and the roads becoming quite muddy we were anxious to try the machine in the mud. She plowed right through like a freight engine. We made several calls around the city, then struck out for my country calls.

We had not gone more than 2 or 3 miles when we began to slow down, but we attributed the cause to the existence of some heavy mud along that avenue in the shade of some tall poplar trees. We did not journey long, however, before we met a man in a steam car of about the same capacity and weight as ours, who waved his hand furiously for us to stop. We did not know what had gone wrong, but had scarcely come to a full stop before we were completely enveloped in flames, which shot nearly 4 feet above our heads, and I tell you we did not lose many minutes in vacating. My assistant closed the gasoline feed valve as quickly as possible, while I procured my medicine case, not wishing to have it burned, although I did not care what became of the machine. I fully expected to see it go up in smoke. It soon quieted down and went out as the gasoline supply was cut off, leaving the paint on the body badly scorched and our consciences slightly seared. Our auto friend said there must be a gasoline pipe broken in the fire box, and, as he had a rope, offered to tow us back to our garage. Just at this time another physician came along in a buggy and took me home, where I got my horse and buggy and made a few more calls before office hours, leaving my assistant to steer the rig home in tow.

MUD CLOGGED THE BURNER.

On arriving home he found that the door of the fire box had worked open permitting

Dr. Wayland's Gasoline Automobile.

Stevens-Duryea Gasoline.

the mud to splash in, clogging the burner under the generator. He gave the burner a thorough cleaning, and, fixing the spring on the door, we ran nearly 20 miles after office hours that evening.

INACCESSIBILITY.

As everything was so unhandy to get at it took my assistant almost all of every afternoon to get the machine ready for the next morning's run. However, we managed to average from 30 to 50 miles per day.

About three weeks after our fire we had an exceedingly disagreeable rainy morning to start out, with an extra long run to make. After passing over a few miles of fairly good roads, considering the weather, I remarked to my mechanic that if we made the rounds that day all right my respect for the auto would be greatly increased.

We soon turned off the main road into an untraveled lane, which was well supplied with mud holes and ruts, the mud being nearly hub deep in places. A young man had accompanied us that morning to try the sport of the automobile. Sometimes the rig would stand still and the rear wheels would spin around, nearly burying themselves in the mud, and we would all three be obliged to get out and push the machine, although the engine seemed to have an abundance of power. After a struggle we reached our destination, tanked up and soon returned to the main traveled road. After going about a mile further

A LOUD KNOCKING

developed in the crank case of the engine. We stopped to investigate, but as it was a long tedious job to remove the crank case we decided to take our chances and try to go on. We had not proceeded far, however, before a crashing and banging under the machine that nearly lifted us from the ground caused us to come to an abrupt stop, about 10 miles from home and 4 miles from a telephone.

I asked my mechanic what the prospects were for going on, and he seemed to think they were not very bright, so I started out to walk to the nearest telephone, when I met a boy about ten years old who had ridden up on a horse to see what the trouble was. I offered him a coin to go and 'phone for my horse and buggy, which he gladly accepted. By this time my mechanic and the young man who had accompanied us had gotten the machine under headway by pushing it backward and forward until it loosened up. It groaned and moved along about as fast as we could walk, making so much noise that the children and farmers came out to see if some combined harvester was passing. In this manner we managed to get over about 6 miles, one of us riding and the other two walking, part of the time pushing, until we met my coachman with the buggy. I now deserted the auto, leaving my mechanic and young friend to finish the trip home. They had not gone far when the chain broke, which they replaced by an extra. They finally had to take off the crank case to investigate the trouble and found one

COUNTERWEIGHT,

which is composed of a brass web filled in with lead, broken off in the bottom of the case. The lead had been torn from the web and all ground up. The other counterweight was almost ready to drop off.

Each weight was fastened to its crank by four quarter-inch machine screws, with no means of locking them. Rods, boxings and our "octopus" oil pipes, bent in every direction, made a deplorable sight when the engine case was opened. After we saw the condition of affairs we did not blame the auto as much as we did the manufacturer. Two days elapsed before everything was straightened out and adjusted. We ran about two weeks without any counterweights, which caused a perceptible vibration. At the end of that time we had some soft bronze weights cast and put on with two five-sixteenth rivets. Thus the trouble with the counterweights was ended. We had two more fires caused by crowding the machine too hard against high wind and the use of 68° gasoline, but we did not call for a "tow" at these times, as we stopped about five minutes to regenerate the burner and then proceeded.

PACKING TROUBLES.

The next three or four months my chief trouble was from the packing on the two pistons and the two valve rods. Sometimes the packing would stay in only one day, but generally it would stay about a week. The longest time it stayed in was three weeks, averaging about 35 miles per day. The packing that we found to be the most serviceable was composed of asbestos wicking soaked in graphite and oil and wound into the gland with a thin strip of rubber to prevent it from cutting the rods.

The packing that came with the machine consisted of washers cut out of four ply rubber belting, moistened with graphite and oil, but the hot steam and oil dissolved the rubber and the threads of the canvas were cut into such short pieces by the punching process that it was soon blown out by the high steam pressure. This did not detain us on the road but was not very pleasant. All four glands could have been packed in ten minutes if we could have had access to them readily, but as before stated it took about two hours to disconnect and remove the body, tanks, engine jacket and lubricator pipes, before the stuffing glands could be reached, to say nothing of putting it all together again. The carriage weighed about 1,500 pounds with the tanks filled, and would run from 6 to 9 miles on a gallon of fuel, depending upon the condition of the roads.

A PUNCTURE HEALER.

In about seven months we covered 5,800 miles, with very little tire troubles. Three punctures with wire nails were remedied by injecting into each tire a mixture of about one and a half pints of yellow ochre powder, graphite and water mixed to a thin paste. During this time the rear tires wore through the rubber and three thicknesses of canvas, yet they would hold air when they were removed. One front tire was defective, but was replaced by the factory and the other front tire has never been punctured. It has been pumped up a few times during its run of over 8,000 miles and is in fairly good condition yet.

By this time I came to the conclusion that the auto was a good thing for me if a few mechanical obstacles could be overcome. I had ordered a few automobile journals, including The Horseless Age, and requested my mechanic to study the situation vigorously.

BUYS A HYDROCARBON MOTOR.

We decided on the hydrocarbon system as being the best suited to my service. I thereupon purchased a horizontal, single cylinder machine of about 800 pounds weight, one of the kind with a rubber gasket in the cylinder head that has to be changed "twice in awhile."

I obtained fairly good service out of it for about 4,000 miles, in which time I wore out three and a half sets of tires, which cost me $60 per set, except one which the company replaced. The tires were 28 by 2½ inch single tube and altogether too light for the machine. I have observed that the hydrocarbon system is more severe on tires than the steam, especially the single cylinder, slow speed type, on account of the intermittent torque, conveyed to the rear tires, which seems to separate the canvas from the rubber. This can, to a certain extent, be overcome by putting on larger and more flexible tires, rated at about twice as much carrying capacity as the weight of the machine; so we put on 3x28 clincher tires, costing about $100 a set. I find that they stand up well and seem to give about 5 miles per hour more speed with the same existing conditions of the motor.

COMMUTATOR TROUBLE.

One evening I had the little machine out in the country, and it had done its work faithfully until about 11 o'clock, when we were homeward bound. She ran to the top of a little hill and stopped, about 4 miles from home. The lantern was taken from the front and a search made, expecting to find a battery wire broken, but after looking carefully we found everything in comparatively good condition. I had begun to contemplate walking home, but my mechanic assured me that we would find the cause of the delay soon.

After testing the battery circuit several times we found that by some inevitable freak of nature the commutator (a steel ring driven on the worm shaft and fastened by a tapered pin) had become insulated from the worm shaft. By battering the pin with the centre punch, which com-

OFF FOR A STORMY NIGHT'S RIDE.

A TOLEDO STEAMER ON A HEAVY GRADE.

the contact, we were enabled to con- our journey.

GE TOO GREAT FOR LIGHT MACHINE.

er having run about 4,000 miles, it to show signs of giving away. The brass balls in the gasoline pump wore n the first 1,500 miles and were re- d by steel ones, which have shown no of trouble and have run three times as the others. The crank shaft was ight for a 4½ cylinder, it being 1¼ s at the main bearings, and brought to 1 inch in diameter where it went gh the planetary transmission by a der on both sides of the 110 pound fly- l. One night I had a call about 14 in the country, and when about 12 out the crank shaft broke off of both of the flywheel and left us without urther ceremony to walk the rest of ay.

gentleman to whose house I had called let us have his buggy and horse ive home. He towed our machine in ext morning with his steam machine. about a week's delay a new shaft put into place. I find that all the bolts in the engine and running gear loose in running less than 50 miles tightening up. One of the front les dropped off while running at 15 miles per hour on a smooth pave-

ONSTRUCTS A GASOLINE MACHINE.

ile my little machine was running I was so pleased with the hydro- n system that I concluded to have team machine converted into a gaso- machine. I decided to trust my me- c with the work, and with a few ex- ons left him to do as he chose. I re- ed him to use as much of the old ma- and to lengthen the wheel base from 80 inches, also lower the body as as practicable and have a transmis- of three speeds forward and a re- . He set to work drawing plans and ing the market for an engine and mission, but could find nothing that d fit in so narrow a space. So he designed and made nearly all the patterns for the engine and transmission, having the machine work done here in local shops. The engine is of opposed cylinder type, 4 inches in diameter by 6 inch stroke, and the transmission consists of a planetary system, three speeds forward in the ratio of 7, 18 and 30 and a 7½ reverse. All four are handled with one lever, located at the right of the seat. The crank runs in an enclosed oil case, which seems to lubricate thoroughly.

Being so disgusted with our former experiences of inaccessibility to parts of the machine, we decided to make everything easy of access. Either piston can be removed for inspection and replaced in less than ten minutes. The machine now weighs, ready for the road, about 1,600 pounds and is equipped with one of those little freaks—a dynamo. This would have worked very well had it not been that no thrust collar was put on the armature shaft, which caused eight strands of wire to become worn through, and it ceased generating. It became very irregular in firing, until we thought we would have to discard it, but by splicing the wires and placing a vulcanized fibre collar, to prevent any further rubbing, we remedied our dynamo troubles and it has worked very satisfactorily ever since. I have covered about 2,500 miles with the machine and am quite well pleased with the operation of the engine.

We used 55° distillate for a time with some satisfaction, but owing to the difficulty it gave us in starting we discarded it for a mixture of distillate and 68° gasoline.

This machine will run from 6 to 25 miles per hour on high speed with all the gears locked, and 22 miles on one gallon of fuel. The speed of the motor is controlled by a push button in the floor which throttles the inlet pipe, and the spark shift is controlled by twisting the steering handle, which makes it very convenient, enabling the motor speed to range from 200 to 900 revolutions.

The water is circulated by a friction drive centrifugal pump through 24 feet of five-eighths flanged radiator pipe, which prevents the water from boiling.

The only trouble that we have had, aside from the above mentioned, and a wire breaking once in awhile was caused by skidding on the pavement, which threw the dynamo belt into the chain, and winding it up on the small sprocket, buckled the radial arm and broke one of the reaches.

After an experience of over two years with automobiles, I am convinced that they are the coming means of locomotion, but as yet are not entirely practicable.

25,000 Miles with Light Steam and Gasoline Automobiles.

By W. M. Mason, M. D.

I have used light automobiles continuously and exclusively for all my driving for the past three years; not six or seven months of the year, but 365 days and a liberal percentage of the nights in every year. During this time I have kept no horses. I average 600 to 900 miles per month, making nearly, if not quite, a total of 25,000 miles of automobile travel. The first two years I used a steam carriage, and the past year a gasoline rig.

My first carriage was a light steam runabout, made by a prominent Eastern firm, and among the first shipped to the Pacific Coast; it also was among the first turned out by the factory. It was far less substantial than the later models of the same factory. The wheels and running gear were much too light, and it was not equipped with water column or hand feed pump. I mention these things to show that I had a comparatively imperfect machine at first, quite likely one of those referred to by one of your correspondents as "fitted only to run in circles on the parlor floor," and I am sure that I could make a much better record with one of the later models.

After ordering the steamer, and before it came, I made quite a careful study of steam machinery, and when it arrived my

brother, who is a first class mechanic and steam engineer, helped me put it together, thoroughly testing every part. Then we gave it a careful road trial, he giving his whole attention to the engine and machinery and I handling the carriage, trying and adjusting until everything was working properly. Before venturing out alone he taught me the practical use of every part of the machine, how to take it apart or adjust—in fact, mastering every part. He at once observed the fault of the lack of a water column and a hand boiler pump, and after a short time I added these improvements.

I used the steam carriage constantly for two years for all my work, and during that time I was towed home only twice. The first time was before I put on the hand pump. On account of a leak in the pipe from the boiler to the engine I could not keep enough water in the boiler with the regular engine pump. The other time I burned some tubes in the burner. On account of light construction and hard usage I occasionally had to make minor repairs on the road. For instance, a broken chain twice, a broken reach rod, a bent pump lever and a leak in the water pipe to the boiler. But as I always carried a full set of tools, bits of wire, extra links for chains, extra pump lever bolts, nuts, asbestos packing, etc., I was able to repair the breaks usually in a few moments and get home without help.

Principally because of the time required to steam up when getting ready for a quick call, I decided to try a gasoline carriage, as being better adapted for a doctor's work. I finally purchased a light runabout with single cylinder, 4 horse power motor. I kept my steamer for a few months to use in case of a failure of my gasoline carriage, but never had to use it.

I studied the machinery of the gasoline carriage with the same care I gave to the steamer, with the advantage of two years' experience with automobile work and the instructive reading, for the same time, of THE HORSELESS AGE articles, to which, I am sure, I owe much of my success in running my autos. It was several weeks before I got my new rig to suit me. For instance, the carburetor gave trouble by flooding from the overflow of the gasoline tank. They are too near the same level. I extended the overflow pipe up inside the gasoline tank until the opening was above the level of the gasoline, and this stopped the trouble; I also rewired the ignition apparatus. For some time I would examine every part of the machine every few miles for hot bearings, loose nuts, parts out of adjustment, etc., until I knew every pet freak of this particular machine.

After I got it fixed to suit me, which I did in a few weeks, I knew just how much to depend on it; and the total time of delay on the road for the past seven months would not amount to five minutes. Once I had a broken wire to the spark plug and twice a broken wire to the throttle. I wired the throttle wide open and controlled the engine with the spark lever until I could fix the wire at the barn.

This, however, does not mean that I had no other repairs. Every morning I spend an average of three-quarters of an hour in filling tanks and oiling, examining and testing every part of the machine with the utmost care, and when I am through I know every part is in perfect order. Right here let me say that unless one has a taste for mechanics and is willing to do most of the work on his machine himself he will be likely to find automobiling a very expensive and annoying pastime.

In the morning when I get through with my machine I am absolutely sure it will go to its full capacity and not delay me on the road. I can tell the time a given trip will take me almost to the minute and I never think of making allowance for extra time on the road. I always run either machine either day or night with every ounce of power I can coax out of them and much of the time over roads so rough that one can hardly stay on the seat, and every part is frequently strained to its utmost limit. I find I average 17 to 19 miles an hour with either machine. The steamer will spurt much faster for a short distance, but the above speed is about all the boiler can stand on a steady pull, and, moreover, about all the carriage, with its short wheelbase and narrow tread, with weight high up, will bear and stay on the road. The gasoline carriage will not spurt a bit, but it is longer and wider, and the weight is lower, so I can average about the same speed as with the steamer.

TIRES.

These give me but very little trouble. I use single tube tires, well loaded with "Neverleak" tire fluid. This prevents leaking of air from valves and the air from gradually working between the layers of the fabric, and will usually take care of punctures with tacks or small nails. For repair of punctures with larger nails I vulcanize the edges of the hole with a bit of redhot wire and insert a plug, using good cement; any good bicycle repair man can show you how it is done. I seldom discover punctures until looking over the carriage in the morning, as the tack or nail usually stays in the puncture and the tire fluid prevents it leaking air. I have never repaired a tire on the road yet. One thing I consider of great importance is to keep the wheels jacked up when the carriage is not in use. It takes only a few seconds when you come in from a run if things are arranged conveniently, and it certainly adds immensely to the life of the tire. Rubber will deteriorate very rapidly if kept under constant strain. I bought two extra tires for the steam carriage and these, with the four original ones, are apparently good for several thousand miles yet. Those on the gasoline carriage show but little wear after a year of work. I always keep an extra tire, but so far have not used it.

A question has arisen as to the effect of oiled roads on tires. I have been over newly oiled roads nearly every day this summer and I cannot see that it has injured the tires any. It spots the paint on the woodwork worse than anything else.

REPAIRS.

These certainly should not be nearly so expensive as the articles written by most of your contributors would seem to indicate. I have fitted up my barn with a work bench and a few tools, as a vise, drills, wrenches, soldering outfit, wire of various sizes, an assortment of bolts and nuts and a few extra parts, costing possibly ten or fifteen dollars.

Spokes seem to give much trouble. I always keep a dozen or so extra ones, and it is not uncommon to find one or two broken in the morning after a long hard run, especially at night, as the carriage is pretty sure to get some hard bumps at such a time. It takes five or ten minutes to put in a new one, so I do not mind it very much. If those who have so much trouble putting in spokes in the drive wheels of the steam carriages will bear in mind that the spokes can be easily bent as they are inserted through the slot in the hub in order to pass the cones of the rear bearings, and after they are in place can be easily straightened again, they will have no trouble. I have replaced in this way nearly half the spokes in the rear wheels of the steam carriage without ever having taken off the wheels. All the minor repairs I do myself.

COST OF OPERATION.

The following is a careful estimate of the cost of using my steam carriage for 1,000 miles:

Gasoline, 100 gallons at 18c.	$18
Oil and incidentals	1
Repairs and improvements	4
Tires	2
Interest on $900 at 6 per cent.	9
Depreciation in value	40
Total	$74

I averaged 10 miles to the gallon of gasoline and the estimated distance traveled by the carriage is 15,000 miles. First cost, $750; plus freight, $100; plus improvements, $50; and I sold it for $300, making deterioration $600, or $40 per 1,000 miles. The other items have been over rather than underestimated. This makes $74 per 1,000 miles, or 7 4-10 cents per mile.

COST OF OPERATING GASOLINE CARRIAGE.

Gasoline, 40 gallons at 18c.	$7.20
Oil	1.00
Repairs, possibly	2.00
Batteries	1.25
Interest on $750 at 6 per cent.	6.00
Deterioration not over	20.00
Total	$37.45

I average 25 to 30 miles to the gallon of

gasoline. One set of four dry cells will run the engine 1,200 to 1,500 miles and costs $1.75 per set, or about $1.25 per 1,000 miles. The cost of carriage here at local agency was $750. Repairs there have been almost none. Twice a spring broke in the steering gear, but the company replaced it free of charge. Neither the carriage nor the tires show appreciable wear, except possibly the chain and rear sprocket, which may have to be replaced soon, so that the estimate for deterioration is very liberal. The deterioration is much less than that of steamer. This makes the cost of operating the gasoline carriage less than $38 per 1,000 miles, or 3 8-10 cents per mile.

COST OF HORSES FOR SAME WORK.

I should have to keep three good horses and a man to care for them to do the same amount of riding that I do at present. This would mean an investment of at least $750 for horses, buggy, harness, etc., and the deterioration is very rapid, as a good horse is nearly ruined after a year of work. Therefore, the depreciation is at least equal to that of the steam carriage. Cost of feed and care for horses for one month, not less than $45, and average distance driven, 700 miles.

Horses per 1,000 miles	$68
Interest on money invested	6
Deterioration	40
Shoeing, repairs of buggy, etc.	4
Total	$118

This makes about $120 per 1,000 miles, or 12 cents per mile, which I think other physicians will find a reasonable estimate.

I have allowed nothing for the care of the automobile while estimating the care of the horses. The reason is as follows: I can care for the automobile myself, with sometimes a little cheap help for rough cleaning, etc.; but no physician can clean and care for a horse and be fit to enter the sick room, especially to do surgical work. Even after an hour or two of work with baths, antiseptics and change of clothing there is danger of decomposing animal matter carrying disease bacteria still clinging to some part of the person; while with machinery you can get as black as you like, and a few minutes of gasoline, soap and hot water and a change of clothes and you are as safe as before from the danger of disease bacteria—in fact, much safer than where the horse is only driven, as the lines, laprobes, halter, gloves, etc., are sure to be more or less covered with decomposing animal matter, while nothing of the kind need be feared with the automobile.

SOME OTHER ADVANTAGES.

The financial part is by no means all of the story, either. I find I can drive a horse but seven miles an hour on an average and less than that on a very long trip, say, of 40 or 50 miles, as I frequently do, while with the automobile the average is over 17, and this means several hours a day to the doctor; and with a large practice to attend to it means hundreds of dollars a year, to say nothing of the satisfaction of being able to reach a patient miles away in a few moments after a hurried call, when perhaps a human life is trembling in the balance.

COMPARISON OF STEAM AND GASOLINE.

Each system has distinct points of advantage. For pleasure riding, where a few moments to steam up are of little consequence, the steam carriage might be preferred for its beauty and certainty of control, smoothness and flexibility of running and enormous reserve power. Then, too, most people find it easier to detect trouble and make road repairs with the steamer. For the physician, however, I consider gasoline by far the best. It is cheaper and for continuous work this amounts to quite a little with gasoline at the price it is in California. But the most important point is the convenience. It is ready to start at a moment's notice, day or night; can be left standing a minute or hours with perfect safety; there is nothing to watch at night. The absence of an open fire is also a great advantage. I doubt if any fire can be so arranged that it will not act cranky in a 40 or 50 mile gale, and while no sane man would go for a pleasure ride at such a time, it is just about then that a doctor is quite likely to be called, and the gasoline engine will go plodding along as serenely in a hurricane as in a dead calm.

CONCLUSION.

In conclusion I would say the machinery, including the chain, must be protected from dust and mud. I fitted a tight oil cloth cover over both machinery and chain, and everything practically runs in an oil bath. As a result, after 7,000 or 8,000 miles the bearings on my gasoline carriage show no perceptible lost motion.

My idea of the best carriage for a doctor is a light, very flexible, high powered machine, probably gasoline, multiple cylinders and quite likely air cooled; light weight, for the doctor does not habitually take a pleasure party with him; very long, flexible springs and machinery so arranged to allow for great latitude of motion without breaking or cramping.

After three years of use I would not go back to horses if they were furnished me free of cost with a man to drive them, and neither do I think it would pay me financially to do so.

Historical and Special.

Personal Experience of a Pioneer.

By Dr. Carlos C. Booth.

My first experience with the automobile was with a machine I used during the winter of 1895 and 1896, the summer of 1896 and the winter of 1896 and 1897—about eighteen months in all. The machine was built from my own design and was an ideal doctor's cab. The greatest difficulty I had with it came from frightening horses. Thinking that the high top was the cause of scaring the horses, I had it cut down and made into an open car. Being the only automobile in the county and State, the horses caused me an endless amount of trouble. The curiosity of the people also was embarrassing, as every time I would stop the vehicle in front of a house it would soon be surrounded by a curious crowd. So far as its value as a means of getting around to see my patients was concerned I thought a great deal of it and really found it a great convenience, as it took the place of one horse. Having so much horse trouble, and no relief being in sight, as there were no other automobiles in the city, I disposed of this early production to Mr. Owens, of New York.

On February 1, 1902, I ran into my boarding stable another automobile, which I have used in my practice continuously ever since, excepting on rainy days. During this time, about ten months, I have run it about 2,500 miles. I have had it hauled home only twice, both of which times I had broken off one of the front wheels on car tracks; which, of course, would disable any vehicle. I have met my professional engagements from 5 to 15 miles from home, and on one occasion 50 miles from home, just as promptly as one could with horses and better, besides enjoying the pure country air and scenery as it only can be enjoyed. During the month of July I made a 10 mile trip regularly every morning and dressed a case of appendicitis for which I had operated and was treating. On many of these trips the mud was from one to five inches deep. There are now several automobiles in town and our horse troubles are practically at an end. The intelligent animal soon learns that the automobile will not hurt it.

There is no question in my mind about the auto being a time and money saver in communities where the roads are good. Our city is located mainly in the valley of the Mahoning River, but most of the residences are on the hills which rise 200 feet from the centre of the city within a radius of 2 miles. The grades to the top of these hills are anywhere from 5 to 17 per cent., from which you will see that it is a hard town for an automobile. I nevertheless prefer the auto to a horse for use during nice weather and good roads. It is just the thing to let stand while you have to wait from one-half to twelve hours, as doctors often have to. The exercise connected with running an automobile is very well suited to the physician. The rapid movement and exhilarating effects of the pure air are certainly conducive to much healthful pleasure. I have no hesitancy in recommending the automobile to any physician who is located in the midst of good roads.

NOW FOR TROUBLES.

An automobile that is properly constructed should give one a minimum of

trouble. With few exceptions trouble is due to faulty construction. To avoid tire trouble you should have tires put on that are guaranteed to carry at least 1,000 pounds more than your machine weighs. As to batteries, one should inspect them often and always keep an extra one on hand, for they will get out of repair and need frequent renewals. One good extra spark plug will avoid troubles from this source. My experience with gasoline is that anything that I can buy will answer the purpose. The exceptions noted above refer to the spark coil and man's natural forgetfulness. As regards the coil, sometimes the vibrator screw will work loose and fail to make contact. The other trouble is that one will often forget, or rather neglect, to supply the machine with its vital necessities, such as oil, gasoline and electric current, by failing to have a sufficient supply or to turn them on before starting. An engine should start on the second turn, and it will if everything is right. A sudden stop of the motor is usually due to break in the electric circuit.

HOW TO SELECT AN AUTOMOBILE.

For physicians' use an auto should not weigh more than 1,400 pounds, should have a 6 foot wheel base, one good elliptic spring under each corner of the body, seating capacity for two people, plenty of seat room and plenty of room in the front end to carry satchels, &c. Tanks, radiators, connections and pump should be of the very best material. The make and break device should be of the simplest construction.

Do not pay for an automobile until you have seen it actually climb hills that are as steep as or steeper than those in your immediate vicinity where you expect to use it; also see it put through everything claimed for it. You had better spend $100 in railroad fare and thorough examination of an automobile than to get one that is not suitable to your purpose or is faulty in construction. Really, the better way is to make careful inquiries of some physician who has used one of the machines you contemplate buying.

CARE AND OPERATION.

As to care, I can dismiss the subject by saying that it should have the care you will give anything that costs you from $500 to $5,000. As to operation, the first requisite is an understanding of the minutest details, which can be acquired in a very short time under a proper instructor. If one owns a machine such as described above there are very few things to learn. You have to run an automobile about 250 miles to become acquainted with it. You will find it not unlike your horse, having a nature and disposition of its own. Always keep your engine running as slow as you can and do the required work.

Treat people with horses as you would be treated or have any member of your family treated. You must not cause runaways even if you lose time and are obliged to go out of your way. Conduct yourself so that, should a horse do damage, you can call any horse owner that you ever met to testify that you had always treated him as a gentleman should, and you will have a verdict in your favor.

Out of the Wilderness.

By Dr. W. P. Hartford.

Automobiles have been so well and exhaustively written up that I feel how utterly impossible it will be for me to say anything new on the subject. But there is one phase that I have not seen touched. To run an automobile successfully requires a large amount of that talent sometimes called mechanical ingenuity, which, by the way, is a faculty that the medical fraternity must have in a higher degree than any other of the learned professions. A doctor who can diagnose an obscure disease by a symptom that may not have attracted the attention of the patient himself will by an almost identical train of reasoning find out what ails a balky engine. And if he is engaged in general practice he is almost certain to have a keen, practical mind and can reason inductively. If I should need the services of a physician in a strange town I should certainly select the one that could locate the trouble in a crippled clock, sewing machine or telephone, feeling sure he would be able to find out whether my trouble was in the sparker or the mixing valve. But unfortunately a good many doctors who could run and enjoy an auto think they cannot afford to buy one. This is the kind of an automobilist that I sympathize with, and belong to, and I believe when we do get an auto we are a little bit happier than anyone else. We feel sorry for the man that can hire a chauffeur and does not have to live on corn bread and liver to save up money to buy his machine.

FIRST VENTURE.

My first venture was a steam machine, second hand, guaranteed good as new, and I thanked my lucky stars a good many times it wasn't new, for I had it on fire the first thing, because the lighting torch was not hot enough. I learned that a match must never be applied if there is a liquid spray at the nozzle or a drop of gasoline in sight. After oiling it all over, even to the cross head pump, I started out up a long hill and had to come back coasting, because the pump would not work. Then I learned that oil will paralyze a one-eighth of an inch check valve. Next time I started with a glassful of water, and still had a glassful when the boiler scorched. Then I learned that the little check valves on the cocks that support the water glass sometimes stick and prevent the glass registering properly. This looked like a big bill for repairs, but I got a nice round punch of the right diameter, and had a blacksmith make me a little square punch with a lip on one side. By driving the punch pretty firmly into a tube and heading all around with the square tool I had no trouble in making the boiler tight, and by throwing the little check valves away I had no more trouble with the water glass registering, except when one broke occasionally, and then I always wasted a boiler of water.

On a long uphill run the pump sometimes failed to throw enough water, but by using an injector I could fill the boiler at the expense of a lot of steam, but a few minutes' wait would remedy that. I got an injector for $1.60 (not at an automobile supply house) and could fill the water tank at a horse trough or creek. A piece of sheet iron bent up in the form of a trough, with a piece of asbestos paper saturated with gasoline, made as good a torch heater as if it had cost $2. The back breaking job of pumping up the air tank was made much easier by getting an old beer pump for $1 from my friend, the saloonkeeper. By grinding the valves and putting on a new leather it would fill the tank to 30 pounds in no time. A couple of little 4 volt elec-

First Automobile Used in a Physician's Practice in the East, a Duryea Used By Dr. Henry Powers.

First Automobile Used by a Physician in the United States. Built by Dr. Carlos C. Booth.

An Old Timer—An Early Haynes-Apperson Machine Used by Dr. Hartford.

tric lamps, one at the steam gauge and one behind the water glass, proved very handy, as by touching a push button they would give sufficient light to see how the steam and water were. And by using a little kicking coil I could get a spark that would light the flame when the wind was too strong for a match.

I had a lean-to built at the side of the barn. The walls were double packed with sawdust just like an ice house. By leaving a lighted lantern in it right under the boiler it would stand pretty severe weather without freezing, but the steam gauge always froze up in severe weather while running.

GOOD AND BAD POINTS.

The good points of a steam vehicle, I thought, were these: The vehicle was light and easily gotten out of a chuck hole, and it always went up a steep bank; could be stopped for a nervous team to pass; could be run at any speed; a leak in the pipes was easily located by the escaping steam; repairs could be obtained almost anywhere, and by waiting a few moments for more steam the power could be very much increased.

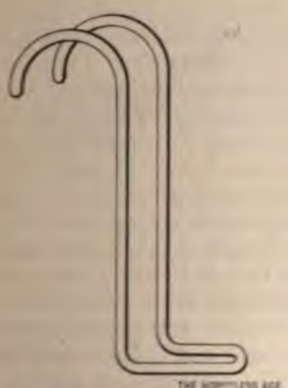
The bad points were danger of fire in firing up; labor of pumping up air tank; trouble of always having to watch water glass and steam gauge; delay in starting of ten minutes while waiting for steam to rise (although by the time all parts are oiled and machine is looked over for loose nuts the steam is usually up), and escaping steam in cold weather.

"CRANKY" GASOLINE MOTOR.

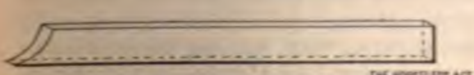
I finally traded it off for a gasoline automobile that weighed about 1,300 pounds, and found that a gasoline engine has 199 different ways of going dead. If the editor of The Horseless Age will get out a special number full of profanity that will be caustic enough to relieve a man's mind when he is cranking a gasoline engine on a hot day with an obstetric case waiting and a crowd of sympathetic (?) natives giving advice, he will confer a boon and fill his pockets with "coin of the realm." Such profanity, if it is to be found, would be worth $2 a word, and a copy would be demanded with every engine. But when you diagnose the case and apply the remedy the gasoline engine is as pleasant as a twenty-five year old widow. It will spit-spat along, hour after hour, mile after mile, and all you have to do is to smoke and be happy—oh, so happy! No joy can compare with driving a docile gasoline carriage over good country roads! The dogs get squelched, the cows take for tall timber, the horses stand on their hind legs, while the drivers pray (?) for you in the identical phrases you used on the engine when it wouldn't go. The pretty girls ask for a ride and you are so proud! No man would trade a well behaved automobile for angel's wings, and not the least of the pleasure is the thought that you have conquered the beast of a thing and will have to conquer it again and again.

LEARN TO KNOW IT WELL.

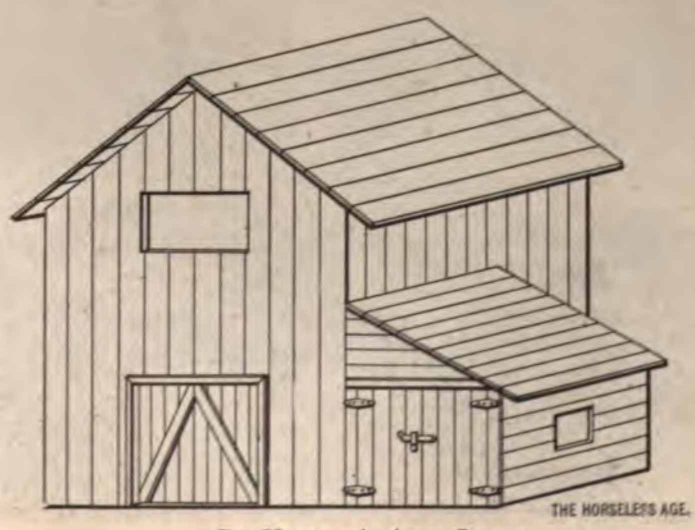
Before trying to run a gasoline engine go over it thoroughly. Understand especially the sparking mechanism. Nine times



Dr. Hartford's Lamp Bracket.



Dr. Hartford's Tool for Expanding Boiler Tubes.



Dr. Hartford's Auto Stable.

out of ten the trouble is in the spark. It should be vicious and snappy and only experience will tell the size and kind of spark that is strong enough. The worst trouble I ever had was with a battery that was a little too weak. Everything seemed all right—gasoline supply, compression and spark—but the spark would not ignite the charge.

A gasoline engine is a very simple problem if looked into right; if the compression is right, the gasoline supply right, the spark right, it goeth—otherwise it does not, and any doctor that can diagnose cholera morbus from appendicitis or intussusception can run one.

I think the good points in a gasoline automobile are starting instantly, running with little attention and absence of water or steam gauges. The bad points are less positive speed control and uncertainty of starting. Starting is more or less difficult, generally making it necessary to dismount. The heat of the jacket water always annoyed me, and there are more parts to look after and trouble is rather harder to locate. I finally sold my gasoline auto and bought another steam machine, and feel that I ought to be in a position to advise brother medicos which is the best. But I am not. Each has its good and bad points, and it is doubtful if that question is ever to be settled.

PERSEVERANCE NEEDED.

But I can advise the doctor to buy an automobile and stick to it through good and bad until he can make it go. It is never tired, makes better time than a team, in hot weather will go further in a day than three teams and will not have to be rested every 20 miles. Learning the kinks of its mechanism will be worth the price of it in mental discipline alone, and if there is anything in environment a child born with an automobile at the door should be a hustler at least.

If you are a little hard up buy a second hand machine, a turning lathe and set of taps and dies with some drills, files, hammers and a vise. When you have broken and mended everything but the steering handle, and maybe that, trade it for a different kind. Do the same, sell it and buy a good one and be happy. Counting launches and automobiles I have owned and run ten steam and gasoline engines and still enjoy a streak of bad luck with an engine (after I get it running), but I never had a gasoline engine I could bet would run another revolution or a water glass I could keep from looking at every two minutes. My most satisfactory steam engine, as far as attention went, was a kerosene burner with automatic water regulator, and the most satisfactory sparking outfit a dynamo with storage battery to start with.

A HORSE FOR BAD WEATHER.

The most economical plan for making my trips, I find, is to use an automobile when weather and roads are good, and a livery team for bad roads and very bad weather. My favorite light for night driving with either automobile or horses is made by taking a piece of No. 12 telephone wire, bending it double astraddle of the centre post at the top of a common 60 cent tubular lantern, then bending the wires up to a right angle; bending the two ends straight down and thus making two hoops that will slip over the edge of the box and leave the lantern hanging under the vehicle. It cannot swing, won't jar out and will show the ground plainly right under the wheels, which no lantern on the dash or at the sides will do.

GASOLINE AUTOMOBILE OF DR. A. J. HODGSON.

A Doctor's Experience Constructing an Auto for His Personal Use.

By A. J. Hodgson, M. D.

I have always been interested in mechanics as a pastime, and some time ago I determined to study the auto as a means of locomotion for my business, to take the place of a pair of horses.

When a boy I had the misfortune to lose my left hand. Of course no autos are made to meet such a case, all the clutches being worked by the hand; hence I had to devise one which could be operated by the foot. But not for this reason alone did I wish to build for myself, for after carefully looking over a large number of vehicles on the market I thought I found in each one some serious, though often easily remedied, defects, such as complicated oilers, chains of various kinds and for various purposes, universal joints and deeply hidden motors. The Chicago shows of 1901-1902 gave me a good opportunity to observe the defects on the machines offered for sale.

Studying the question of power, gasoline appeared to be the only one practical, as small tubes on steam machines are liable to freeze in cold weather, and much time is consumed in charging batteries for electric power. To eliminate all the defects possible was, of course, my purpose, and I did not expect to get a machine for small cost.

Before purchasing anything I made my plan for the ideal machine, which should embody the following points: Two cylinder vertical motor, jump spark, cylinders cast in one piece, no chain whatever, everything geared, every nut to be locked or have cotter pin, no universal joints to transmit power, a positive oiling device that will cause no trouble, no machinery attached to body, artillery wooden wheels, detachable tonneau, irreversible wheel steering, all running parts enclosed in dust proof case; water and gasoline tanks, batteries and all controlling devices fixed on a permanent footboard, so that no vital part of the machine is disturbed by removing the body. The material to be used was nickel steel, tool steel and phosphor bronze, each where best adapted.

The accompanying photo presents the result of this ideal. Before it reached this stage of development, however, the writer passed through many trials, principally through defective workmanship in the running gear and motor. It was very hard to determine what motor to buy, as there are quite a number on the market, and all are claimed to be perfect. At last I ordered one equipped with jump spark. It came, after very great delay, with make and break spark. I was very anxious to test the vehicle and did not wait to send back to the factory to get a jump spark igniter put on, but tried the crude mixer and make and break spark. In short, it proved a complete failure—the mixer could not be used. The sparking device was always getting out of order and the inlet valves were too weak. I then purchased a

well known float feed carburetor, and that ended the mixture trouble. I shipped the motor back to the factory, 1,000 miles, waiting long for it to reach the factory, then went there in person and had them equip it with a jump spark igniter under my own observation. It was reshipped, but our trouble had not ended. It would miss explosions and deliver little power. Four or five days after we began to run it with jump spark cold weather came on and I put some calcium chloride in the cooling water. After running 3 or 4 miles the engine ceased to move; 'twas zero weather and anything but pleasant to be out in the snow. I worked the engine backward and forward and at last got it started on one cylinder, reached home and took the spark plug out of the bad cylinder. The combustion chamber, as well as the upper part of the cylinder, was full of calcium chloride. I found the workman in assembling the engine had failed to tighten this plug with a wrench. This was done and the engine has not missed an explosion since. It develops plenty of power for snow or hills. I ran the machine the best I could during last summer. My troubles were with the make and break device and inlet valves; still, during three months I covered many miles and made many calls with it. But now, if I wish to go only a few blocks I take out the machine, even in cold weather. I always take my coachman with me to assist me in case I need assistance and to have it ready to go the instant I finish my call. The vehicle weighs complete 1,860 pounds.

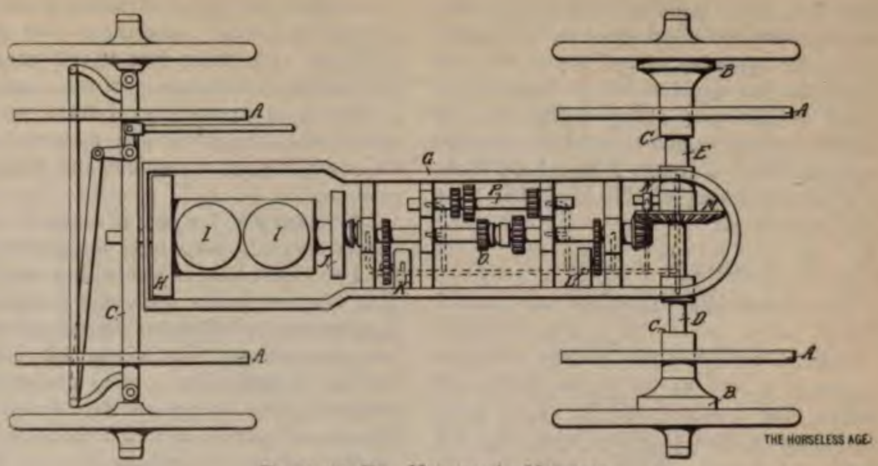
AN AUTOMOBILE HOUSE.

In building my automobile house, 4x4 inch sills were laid on the ground with a flat stone at each corner. Corner posts 4x4 inches, 2x4 inch studding 3 feet apart, and a 2x4 inch plate laid on top of these support the outer ends of the 2x4 inch rafters. This was braced up with 1 inch undressed pine boards running lengthwise inside, and cut so as to leave a space of 4 inches, which is filled with sawdust. The roof is shing'ed, and a rough board ceiling put under it, the space between the roof and ceiling being filled with straw.

The doors open in the middle and swing back; they are of double thickness and packed with sawdust. The house has one window with six 10x12 inch panes. The window is double and well fitted. This makes an inexpensive automobile house and one very warm in winter.

WINTER CLOTHING.

My favorite clothing for cold weather is a union suit of heavy woolen; then a suit of perforated buckskin; then a heavy woolen business suit, then a pair of slicker overalls and jumper (which cost $1.50) and two pair of stockings and felt shoes; yarn mittens over kid gloves; a cap with peak that will pull down over my ears—and cold weather has no terrors. Neither wind, rain nor snow can penetrate such an



PLAN OF DR. HODGSON'S VEHICLE.

KEY TO DRAWING OF CHASSIS.

A, full elliptical springs; B, brake drums, bolted by clips to the wooden spokes of the wheels; C, solid nickel steel axle, 1½x1¼ inches; D. solid nickel steel axle; E, steel sleeve; F, roller bearings; G, angle steel frame, forged from one piece, carrying engine and transmission, suspended by bronze boxes below rear axle and from crossbar on front springs in front; H, flywheel of engine; I, engine cylinders; J, friction clutch, operated by foot; K, gear driven rotary force pump for water circulation; L, gear driven rotary force pump for lubrication; M, bevel gear wheel on differential; N, hardened steel rollers to take thrust; O, shifting pinion and clutch shown as used on high speed; P, shifting countershaft used for hill climbing and reverse; dotted lines show tubing supplying a stream of oil to every bearing from the force pump.

outfit; mud washes off easily, and a man is not encumbered with his clothes. If some brother medico will let me know how to keep my nose warm—it is a large, long, sharp organ, and the jacket water don't seem to circulate to the end—financial dyspepsia and flatulence of the pocketbook could be as easily borne as minor ills.

From an Illinois Coroner.

By A. C. Cluts, M. D.

I have not been able to use my machine—a light steam runabout—as much as I would have liked to. It is not a very good rig for heavy roads. I have run it 2,235 miles with very little expense for repairs, not to exceed $10, and only one punctured tire, which was readily fixed. The last season here has been very wet, with roads muddy almost all the time, and we have quite a number of hills to contend with, which is not very inviting for motoring when you have good horses standing in the barn and a man to hitch them up. The objections to the use of a machine of this class on heavy roads are the large consumption of supplies of water and gasoline, frequent use of the hand pump to keep water in the boiler and skidding. All these consume time and make tiresome work compared with the ease you have with a horse carriage. Some weeks we had good roads. I used the steamer all the time, as I could make my calls in half the time it took with the horse and hardly realized that I had been away from the office. Motoring is a relief to one's nerves—that is, it produces an exhilarating effect, and after returning from a call you feel fresh and ready for anything that comes along. This is not the case if you have been on muddy roads. We have nothing but dirt roads here and they get quite bad at times, yet with a more powerful rig I don't see any reason why one could not go through. I have used my rig only for my practice, which is one reason why I have not more miles to its credit. My largest day was 85 miles, without a hitch of any kind except to fill the gasoline and water tanks. I go anywhere a horse and buggy does if roads are dry, and can about do so in mud if I take time enough. On one trip this summer I had to cross the river bottom road. The river had overflowed the bottom, leaving a muddy stretch 150 yards across and from 7 to 8 inches deep that had washed off the fields and settled on the roadbed. There was no chance to avoid it. I looked at it for a while and concluded I would see how far I could go through. I tied two ropes on each drive wheel and started through. It went slowly, but I kept the wheels turning and in a short time landed on the other side, with a good share of the mud on me and the machine. A little farther on I came to another not quite so long, and on the other side were several farmers waiting to see me stick in the mud. To my surprise the machine was equal to the task, however, and came out in fine style. I have been stalled on level roads, where after a rain thin mud and water were not over 2 inches deep on a hard bottom, the wheels slipping, being unable to take me out either way. I would get out in the mud up to my ankles, give the machine a slight push and then it would run out all right. Greasy roads are terrors to travel over, and this brings up the question of the feasibility of using mud hooks of some kind that could readily be put on and taken

off. Ropes are good as long as they last, but they are too short lived to be depended on for everyday use. They come very handy in emergencies, but we want something we can carry along, clamp onto the wheel in a few minutes and leave it there until the mud is gone. I have been looking for something of this kind but have not found it yet.

WHAT IS WANTED.

The automobile has come to stay. I firmly believe it is the coming doctor's vehicle. And when we become educated to use it as well as we do the horse and buggy, our troubles will be of no more consequence than they are now with the horse and buggy. When I start out with my machine I never think of not getting back with it. Some day I may get left. I aim to take as good care of it as I do of my horses. Machinery must have care, and just as long as we use it we must expect breaks and wear of parts.

So far there has been no rig manufactured to fulfill all the doctor's wants. The doctor's rig should be enclosed, powerful enough to take him over almost any roads, regardless of mud except during the spring thawouts. The interior should be heated from the waste heat of the exhaust, so arranged that this heat could be dispensed with when not needed to warm the cab. Mud hooks should also be devised, to apply on muddy roads. Such a rig I have designed and have about completed. I was in hopes I could have it done and a trial trip made before your issue, but I have been delayed in receiving the motor. When I get it done I will tell you all about it, as I believe it will be the rig for a doctor who is exposed to all kinds of weather.

Machine of Domestic Assemblage.

By Dr. W. N. Fowler.

The automobile as a means of conveyance to enable the physician to attend to his practice has many advantages over the horse drawn vehicle, and there is no doubt that in a very short time it will supplant the horse and buggy for this purpose. Economy of time alone, if there was no other factor recommending it, would in a few years pay for a machine and its maintenance.

Unfortunately for the prospective purchaser there is very little information at hand to assist him in selecting a machine best adapted to his uses, and in making a selection he relies on agents or some one who already has a machine. Bore, stroke, compression, cycle, carburetors, dynamos, etc., as yet are Greek to him. One friend advises a steam machine and another advises a gasoline, and a third electricity, and he eventually falls a victim to some glib tongued agent who is an expert in handling his machine.

My experience extends over a year of time, attendance on several shows, and the assembling of my own machine. I believe that the explosion motor is as yet the most simple and economical power for the average user. The absolutely perfect machine is not yet on the market, although every month sees the elimination of objectionable features from them all.

THE MOTOR.

Beginning with the motor there are reasons for and against almost every type, though some are so insignificant as to amount to almost nothing. The single cylinder, it is true, is more simple, and hence more quickly understood than the multiple cylinder, yet when you understand a single cylinder it requires very little more effort to understand the multiples of one, for that is all a two or four cylinder engine is. To develop the power the single cylinder has to have a larger bore, and a longer stroke and cannot be so well balanced. Consequently we have a certain amount of vibration impossible to eliminate. The single cylinder does not use so much gasoline as the multiple cylinder to develop the same power, though the difference is quite insignificant in dollars and cents. To the physician who rides from 10 to 40 miles day in and day out the year around, the element of vibration is an important factor. Again the single cylinder is not so easily started, because in the four cycle engine you have four strokes of the piston to every complete working cycle or two revolutions of the flywheel; consequently you cannot always start your engine on the single revolution of the starting crank.

Simplicity in the mechanical construction of a machine cuts a very large figure. To the amateur prospective purchaser it is a great inducement and is pushed forward as a winning card by the representatives of this class of machines. To the friend of the explosion motor anything simplifying the working mechanism of an automobile appeals at once.

An air cooled motor is the simplest type of an explosion motor, and though we have some small engines giving very good satisfaction, as yet the large power air cooled engines are not a universal success, though I believe that they will yet succeed, as I inspected and rode in a machine with a 10 horse power engine this last week that remained cool under every test that could be given it and it had given perfect satisfaction for the several weeks that it had been running.

The double cylinder engines as a rule give better satisfaction, in that they run steadier and are more easily started than the single cylinder and give very little more trouble. In the horizontal type, with opposed cylinders, the engines are perfectly balanced and vibration is perfectly overcome. The engine on my machine can be set on a block, run without fastening down and will not jar itself off.

The water cooled engine, while giving the best satisfaction, has to be watched carefully to prevent overheating, and during the winter months to prevent accidents to the cylinders from freezing, and nonfreezing solutions have to be carefully prepared to insure good results and prevent injury to the water jackets.

PERSONAL PREFERENCE.

Physicians in large cities where the modern garage is at hand do not have this class of troubles to contend with, and also escape the annoyance and dirt incident to the proper care of a machine.

My own preference is a double cylinder horizontal engine mounted under the seat with radiator in front, and the transmission mounted on the main shaft, and of the sun and planet type. The engine should have a variable speed ignition device and should develop its rated horse power at a medium speed. The carburetor should have a throttling valve for controlling the speed, thus giving a wide range of speed and considerable variation in the power of the machine. While the high speed engines are considerably lighter, a valid objection

Dr. Cluts' Enclosed Automobile.

is that there must of necessity be a rapid wearing of the working parts, hence a short lived engine, as compared to the heavier one running normally at 600 revolutions with a variation of from 2 to 1,200. An engine of this description developing 6 horse power at 600 revolutions should, if properly constructed, with a proper mixture develop at least 8 horse power at 1,200 revolutions. This engine in a machine weighing 900 pounds, with sprocket to gear it to run at 4½ to 1, will give an average speed of 12 to 15 miles per hour over country roads, and can be speeded up to 18, 22 or 25 miles per hour, which is as fast as one can ride with safety on our public highways.

As the engines run the smoothest at what we call the normal speed, the machine should be geared to run under ordinary circumstances at this speed to give the best satisfaction.

THE SPEED CRAZE.

The speed craze that has seized the manufacturers must of necessity be short lived. The bulk of the buyers in a few years will be the men who will use the auto for strictly business and economical purposes, and a 30 to 40 mile an hour speed is not conducive to safety at the present condition of our roads. We want the power in our engines, but we want our machines geared to a speed within the limits of safety.

TRANSMISSION.

Next to a good engine it is important that we have a good transmission device or endless trouble will follow. For the lighter machines the sun and planet type gives the best satisfaction mounted in line with the main shaft.

RUNNING GEAR.

We now come to the gears, a part of the machine very important to the physician, for a hard riding gear, like a hard riding buggy, will call forth more unprintable words than a bad paying patient. The first machines were made with a rigid frame, which was early recognized as a mistake, and the style has changed rapidly, until now we have a type of gear reachless in its design, very flexible, yet strong enough to meet all conditions of road. The principal objection to this gear is that the large majority are not fitted with satisfactory springs, and when riding at 12 miles an hour the slightest inequalities in the roads become veritable hills and valleys, and we go bumping from top to top of the hills, or up and down with a jerk that threatens to dislocate our vertebræ. My one cry to the makers of springs is to give us more springs, longer springs, better springs, but O no stiffer springs!

A motor car weighing 1,000 pounds must of necessity have heavy springs, but make them better and more flexible, put more length in them—do something to make them ride easier.

ASSEMBLED HIS OWN MACHINE.

My own experience may be of value to some prospective purchaser. When I purchased my engine I had never seen or examined an explosion motor, but I wanted an automobile. I attended the Indianapolis and Chicago shows and came home discouraged. The price was 'way beyond me. I thought and dreamed about it, but of no use; I couldn't stand the price. I had seen the gears, tires and engines at the Chicago show, and the plan to build a machine gradually worked itself into my brain. I had seen at the show a 5 horse power air cooled engine, and began an active and voluminous correspondence, with the result that I soon planked down a lot of my good money for an engine, gears, tires, body, transmission, etc., and after a long delay these began to make their appearance. Now we come to a period that we had better pass over, for least said soonest mended. Suffice it to say that after a delay extending over a period of more than two months we had our machine completed and ready for a test. We turned on the gasoline, switched on the current, turned the crank and got our explosion the first time, I was sure, because I could hear it, for the pet cocks were both open; but the engine would not start. I had seen a large engine start with the pet cocks open, and as I had no instructions to the contrary I thought mine ought to do the same. The day was warm, and in a very short time I was in the same condition. I knew the fault must be mine, but was at a loss to locate it, but at last I closed the pet cocks just as a friend, who had taken pity on me, turned the engine over, and away she went. I soon had it adjusted and running smoothly, with the wheels blocked up and the clutches working, brake and all O. K. We pushed the machine out of the shop and I was proud of it, for it was the handsomest automobile that I had seen, and I don't think that I missed any at Chicago.

Everything adjusted we again started the engine and climbed in and pushed the slow speed clutch over and the machine started with a noise like a buzz saw on a basswood log. I released the clutch, put on the reverse and we ran back much more quietly, but still noisily, and I soon located the noise in the transmission.

After many trips up and down the alley and sundry adjustments, a day or two later at 5 o'clock in the morning we ran our machine onto the paved street, threw in the high speed clutch and experienced the satisfaction of having a machine of our own construction, under the skeptical eye of our friends, start off at a fine speed.

ENGINE TOO LIGHT.

I ran this machine until I was satisfied that the engine was too light for my work and then exchanged it for a larger engine and water cooled. My air cooled engine developed 5 horse power at 1,300 revolutions, my present engine develops 6 horse power at 600 revolutions and 9 horse power at 1,300, so that I have an abundance of power and a steady, easy riding machine. I can make all of my repairs as yet, and have had no tire troubles. I use two sets of batteries, dry cells, and change occasionally from one to the other, as dry cells recuperate if allowed to rest for a time, and I am sure that the battery expense can be greatly reduced by this method, as many batteries are thrown away before they are exhausted.

NEW OILING DEVICE.

I have an oiling device on my own machine of my own construction, which pays for itself in a few months in the saving of the lubricants. It is positive, has no valves to stick and does not have to be looked after once a month. My transmission troubles were many at first, but now they have practically disappeared. Immediately anything goes wrong I can locate it by the sound. If my engine fails to start I can always adjust it in a moment, as I have no difficulty in locating the trouble. My experience in building the machine has been of great value to me, as I had my difficulties at that time. Now I can go to my machine in the night, turn on the gasoline, throw in my switch, turn my handle, and my engine starts. When I come into the stable I always inspect my machine, tighten nuts, fill my tanks, fill my grease cup, oil the few bearings that require it and leave the machine ready to start at a moment's notice. As I said before, the oiling of my engine and all bearings in the crank case need no attention, as the oiling is automatic whenever the engine is running positive, as there are no valves to stick, and too much cannot get in the case, for it is taken from the case as fast as it feeds and the oil is used over and over with but very little loss.

The gasoline or explosive motor has come to stay; properly understood, decently used and well cared for, it is more economical, more reliable and much more convenient than a horse.

The South.

Automobile versus Horse.

By G. Milton Linthicum, M. D.

After a long consideration of the several motive powers and a great number of different makes I purchased a gasoline motor weighing 1,000 pounds, with a limit of speed of 20 miles an hour and a double cylinder vertical engine. This machine in the various contests where it had been entered showed most flattering records, and I believe, from my observations about re-

pair shops, has not been broken more than others of various makes.

PRANK OF A LOOSE NUT.

The only structural defect which it developed was the working loose of a nut in the journal brass of the crank shaft, which nut was thrown on top of the crank and broke out the motor crank chamber. This nut should have been secured by a split pin or check nut.

The machine has a dynamo and storage battery which supply and store the current for running the sparker, a really clever idea theoretically, but my storage battery has not been an entire success, so I have been compelled to have it recharged outside several times.

LUBRICATION DEFECTIVE.

The most serious fault of my machine has been the lubrication of the engine crank shaft journals, which is done by means of two drip cups on the head of the engine. This is not positive, is exceedingly hard to regulate, and has given me great trouble, on two occasions causing the journals to become hot with burning of the babbitting.

GASOLINE FOR ALL SEASONS.

In my judgment whether there be or be not an advantage of one motive power over the other, there can be but one for the physician who will use his machine the year through, and that is the gasoline, because it is impossible to use steam in cold weather, owing to freezing of the pipes. The advantage of the machine over the horse, as it appealed to me before purchasing, was the convenience of ever readiness, its speediness, its non-fatigue, its insensibility to the elements, and upkeep at a figure not a great deal in excess of the horse.

WRETCHED PAVEMENTS.

After a fair trial of four months and over in the most favorable weather I must abandon it as a dependable vehicle, though I do so with great regret. It has been a great time saver and help to me so long as it was in good condition, but this I could not depend upon, so that the delays incident to repairs and the trouble thereby engendered proved greater than the advantages of its use. I, however, believe that the greater part of my trouble has been due to local conditions, and that we have the worst paved streets of any city in the world, for I have traveled in this country and abroad without seeing worse. The streets are paved with cobbles, have deep holes, and are traversed with deep gutters for surface drainage. These gutters are exceedingly severe on a machine, owing to the short diameters of the wheels, as the wheels of a machine drop down into the depths of the gutter while a carriage wheel, having a larger diameter, passes over the gutter by bridging it from side to side. To this must be added the car tracks which are laid throughout the city; in many places the tracks project above the surface several inches. There are very few modern pavements—just enough to show conclusively the great difference in their effect on the machine. In winter the gutters become frozen, and the street cleaners chop little canals through them with perpendicular sides, so that it would be an impossibility for any self propelling machine to pull out of such places.

The rough streets are constantly jolting every nut and bolt loose, the chain is being subjected to great strains, the motor is suddenly surprised with extra work, so that the whole machine is racked and jerked to that extent that bolts and pins give away, and chains break and fly off, keeping one constantly on the alert for small but annoying mishaps.

Thus I must conclude that an automobile for the physician in a country with rough roads or a city with rough streets is not a success, but its use is limited to pleasure, where one can pick his route of travel, but in a city with good, smooth pavements I firmly believe it will surpass the horse, and give much better satisfaction, doing at least the work of two horses at cost of keeping one.

I have gone back to my horses, but I keep my machine for night work and pleasure, for with all its faults I am loath to give it up entirely.

Among the Southern Hills.

By Samuel S. Briggs, M. D.

I have used an automobile for eighteen months and have seen my horse (pensioned for life) but once in that time.

My idea of the requirements in an automobile for the physician are:

1. A vehicle that is easy to start up.
2. A vehicle that will stand ready without fear of something going wrong.
3. A vehicle that will go, even when in bad repair.
4. It should be quiet and easily controlled.
5. It should have ample room for luggage.

My experience has been with a steam machine and I soon learned to dislike firing up, and even with the improvement of a pilot light and generator I have not learned to enjoy the process and have longed for something better. But after seeing an expert and a machinist literally sweat in their effort to start the engines of a big tonneau and waiting forty minutes for results, I left satisfied with the slow but sure method of firing up.

The time required for firing up can be utilized to advantage by making a general inspection, adjusting where adjustments are needed, filling oil cups, pumping tires, etc., always with the assurance that at the end of a certain time the machine will go.

The electric and gasoline vehicles have a great advantage in that they will stand ready without fear of something going wrong, still I have known of a gasoline machine, having run 70 or 80 miles without a hitch, after a stop of a few minutes, refuse to budge. As suggested by a writer in a recent number of The Horseless Age, "You have very little to watch, but lots to hunt for."

My experience with the steam machine in connection with this point has been with the fire, for when cut down by the automatic a gust of wind may blow it out, or since applying the pilot light the vapors may light before entering the mixing tube and thus injure the burner; however, by putting the fire out and letting the pilot light burn these accidents may be avoided.

Other accidents that might and no doubt do occur, have not come within my experience. I have known of check valves failing and allowing the boiler to empty itself through the bypass valve, thus burning the boiler.

Of course, in a long visit, such as a labor case or an operation, it is best to put the fire out and allow the machine to get cold.

I believe the steam rig will go, even when in bad repair, better than the other types. It is true in the multi-cylinder gasoline motors one or more cylinders may be out of commission, and the vehicle will go, but the steam vehicle must be badly crippled not to go.

FEW TROUBLES.

I have had mine fail me only a few times. Once a friend attempted to run it around the block and he never got around. It wanted to go then, but was so twisted and bent in its forequarters that it couldn't. I once had the engine shaft gearing go to pieces, but after picking out the broken balls and fragments of races it came home under its own power, knocking heavily, but running well. The gasoline pipes became clogged once, and again the feed water pipe became clogged, necessitating the use of the hand pump until even that failed. Fortunately it was down hill to the machine shop. I failed to get out of the stable one cold morning on account of a gasket blowing out of the engine side of the cylinder. I replaced the rubber with corrugated copper gaskets, and do not fear a repetition of that accident. One experience gave me great confidence in the steam vehicle. Failing to spread a cotter pin allowed the rod connecting the link with the bell crank to become disconnected, and the engine refused to obey the lever, running backward with the lever forward, running forward with the lever back, and again refusing to move at all. As it was night and late I did not investigate the trouble, but the next time it started forward just kept going until I was home, when I found the trouble.

On another occasion the packing blew out of both piston rod packing boxes and valve rod packing boxes at the beginning of a 36 mile run. As it was a matter of business I continued the run, and came through all right, but broke no speed records.

ourse, the electric automobile runs quietly than the other types, but mes this is a disadvantage, necessi- the more frequent resort to the bell rn. Automobiles are considered but I have had to stop conversation wagon had passed. The noises from omobile are unusual in character, that account are apt to frighten : but a regular, continued noise, unusual, is less apt to frighten In my experience the horse is less frightened than the driver. The of steam trailing behind on cold, days is a serious objection and some alarm among horses, but the ty of city horses don't mind it. Su- ting the steam is said to give a less tible exhaust, and the use of a con- does away with it altogether.

e all types are easy to control, I be- he steam is most easily controlled. ss of control is a more serious mat- rtunately such occurrences are rare. t know that the gasoline machine ins away, but the electric or steam The electric by poor contact at the ller might fuse at the contacts, and rottle connections might fail in the rig. I have known of two cases of ouble with the steam rig; in one the stem broke and the trouble then go. The automobilist succeeded in a block so as to keep open the , and controlled the machine with xiliary throttle. In another instance rty was fortunately nearing home both throttles failed to cut off the The composition disk of the Jen- lve had broken up and a fragment ught in the throttle, and the driver l home unwillingly; fortunately, the door was open and in he ran and l against the back wall, remarking: d—n you, I reckon you will stop."

ROOMINESS.

le luggage room is a feature of im- e to the physician, for he must have place to carry instrument bags, etc., y few automobiles have extra room thing, and it is not always safe to hings on the seat or on the floor you watch them constantly. Of if you take a man with you he can he things, but one idea of the auto- is to be independent of help. Again, rticles may get you into trouble; for e, while on a long trip I had be- ired of checking up on account of you ma'ams," "wild Irishmen," or er you may name them, and deter- to take the next one at speed. I did de a clear jump of 12 feet, but in keup I lost both footing and seat, sarranging the steering, found my- eding toward a stone fence with the ent bag between me and the brake. what I have seen of automobiles I the light steam rigs are best in country. I should not care for a ghing over 1,200 to 1,400 pounds. The heavier rigs require large and very much more expensive tires and are harder on tires. Again, it may happen often that one has to lift his auto, not out of a ditch, but out of a corner or possibly away from a curb. I got in a corner once where the more I cut and reversed the tighter I seemed to get wedged, so I gave up and got out and lifted the thing around.

AN IDEAL.

My idea of an automobile for a physician is a light steam rig of about 1,000 pounds, with a flash boiler and a condenser. It should have a long wheel base for comfort and plenty of room for luggage, with the engine and accessories so arranged that it will not be necessary to dismantle the machine to make repairs nor become a contortionist to inspect the various parts. Great speed is not necessary for the physician. Fifteen miles an hour is fast enough, but the automobile must be capable of taking all kinds of roads and hills, must be easy to control, must not require too much attention, and its radius of action—the more the better.

TIRE COST.

Most people consider the pneumatic tire an expensive luxury. On the automobile it is a necessity, and sometimes a source of heavy expense, but with proper attention and care the repair bill may be kept within reasonable bounds. One set of single tube tires have run me 2,700 miles with but one puncture. As that was repaired with partial success only, I frequently ran with it flat, causing it to leak about the lugs. I had an inner tube inserted, and as far as I can see it is as good as new.

The question of cost of repairs depends on the man who runs the machine. Many small repairs can be made by the owner of an automobile, saving both time and repair bills. It will well repay the owner of a machine to study its construction and working, and give his personal supervision to all repairs.

"The Horseless Carriage."

[Written expressly for the Doctors' Number of THE HORSELESS AGE.]

BY DR. CHAUNCEY CAREY, ELMIRA, N. Y.

If you care to drive an auto—as you ought to—
You should study its anatomy, complete;
The far reaching pneumogastric must be sought, too,
And your thinking centre always kept replete.

Every viscus in its body is essential,
No appendix to confuse or make afraid;
But believe me when I tell you—confidential—
That the surgeons sighed to see it so mislaid.

If it puffs and snorts like any old pneumonic,
You will know its circulation is not good;
And, from other sounds that do not seem euphonic,
You must diagnose as any doctor would.

When a part gets bent or broken you must set it;
For an intermittent pulse give gasoline;
Keep your sparking plug "a pluggin'," don't forget it,
And your journey home will always be serene.

If its vaso-motor system seems deficient,
And its cardiac impulse slow and weak;
Its electro-motor force is then omniscient,
Unless the mitral valve has sprung a leak.

If, in case you have a case of true aphonia,
And it fails to imitate its canine friend;
You must look for laryngitis or pneumonia,
Or stenosis of its windpipe, near the end.

If its metabolic functions are not working,
And elimination does not prove the best;
Just open up its muffler—don't be shirking—
And let the motor run with all its zest.

There's another function, called assimilation,
I forgot to mention early in my verse;
It's a matter that concerns your destination,
And I'll have to try again to make it terse.

It's the liver that controls this vital function,
And controls your disposition, just the same;
And sometimes the horseless carriage runs with unction,
But ofttimes the combination's very lame.

As a courtship proposition I'd suppress it;
For, with head and heart and hands so occupied,
It's a disappointing thought, I must confess it,
And a lady disappointed with her ride.

Then, if I must add to sadness ugly satire,
I'll advise you, though I do it with remorse:
If she care to go again do not deny her—
But go down straightway to Jones, and "Get a horse."

MINOR MENTION

The annual meeting and election of the N. A. A. M. will be held at the Waldorf-Astoria on January 24.

John R. Moreland will resign his position as justice of the peace at Muncie, Ind., March 1, to become superintendent of the Magnolia Automobile Company, Riverside, Cal.

A deal is reported to have been made by which the business of the Canadian Motors, Electric Vehicles Company, Toronto, will be taken over by the Canada Cycle and Motor Company.

An order allowing the receiver of the Automobile Company of America to distribute 10 per cent. to claimants was granted at Newark, N. J., on December 29. The receiver has $63,000 in bank, and will pay out $24,000.

The Hall Gasoline Engine Company has been organized at Portland, Me., to deal in automobiles. The promoters are Frank E. Hall, Quincy, Mass., and Charles W. Richardson and Augustus A. Fuller, Portland. The capital stock is $500,000. Charles W. Richardson is president and Frank E. Hall treasurer.

The annual meeting of the Rhode Island Automobile Club, Providence, will be held January 7. The usual banquet will follow. Nominations of officers are as follows: President, Dr. Julian A. Chase, vice president, Frederick C. Fletcher; second vice president, James E. Blake; treasurer, R. Lincoln Lippitt; secretary, Herbert H. Rice; assistant secretary, Benjamin Clark; board of governors, H. Anthony Dyer, to serve until 1904; R. Lincoln Lippitt and

Lowell Emerson, to serve until 1905. It is estimated that over a hundred Providence automobilists will attend the New York show.

Plans are forming for the annual automobile show in Indianapolis, Ind. It will probably be held in February.

The Holley Motor Company, Bradford, Pa., has been awarded a contract for furnishing 500 motors for an Indiana automobile manufacturer.

The Reserve Automobile Company, Camden, N. J., has been incorporated to manufacture automobiles. Capital, $50,000. Incorporators, Henry J. Kingsbury, John A. MacPeak and Joseph F. Cotter.

Elwood Haynes, president and general manager of the Haynes-Apperson Company, Kokomo, Ind., was recently presented with a handsome chair as a Christmas present by the employees of the factory.

It was inadvertently stated last week that the Federal Manufacturing Company, Cleveland, Ohio, are makers of the Cadillac, when, of course, it was the intention to say that they merely supplied the makers of the Cadillac with chains.

The Automobile Exchange and Storage Company's garage on Thirty-eighth street, New York, has been bought by a new company, of which John H. Robertson is president, and Rodney K. Harris secretary. R. E. Jarrige is to have charge of foreign machines, and the garage is to be enlarged.

K. A. Skinner, Boston, sole United States agent for De Dion, Bouton & Co., states that some dealers are selling imitation parts for the De Dion motors and that the genuine article may be known by the De Dion stamp, which appears on all their goods.

The Park Square Automobile Station has been organized at Kittery, Me., to carry on a general automobile business, with a capital stock of $25,000. The promoters are Thornton Parker, John N. Swanson and A. Moriarity, of Boston. Thornton Parker is president and treasurer.

The International Motor Car Company, Toledo, Ohio, have shipped four steam carriages to Osaka, for exhibition at the Japan fair at Osaka. Eight cars have also been shipped to London, England. The company is making new models of gasoline and steam cars for the New York and Chicago shows.

Alexander Winton is reported to be secretly working on three racers which he will take to Europe with him next summer, and that even his partners do not know what sort of motors he will use. He has constructed a building at his big Cleveland plant, and in this he is putting the cars together.

Statements which have been made to the effect that the Pan-American Motor Company and the Automobile Company of America will be consolidated under a new name, to manufacture automobiles of the Rochet-Schneider type, are denied by representatives of the former company, who say the rumor probably originated from their having purchased the latter company's machinery at a cost of over $250,000. The registered trademark "Panam" will be continued, but the company will not build Rochet-Schneider machines. A site for a factory on the New York, New Haven and Hartford Railroad, between New York city and Stamford, Conn., is being negotiated for.

A. C. A. Matters.

George F. Baker, Jr., H. S. Elliott and H. S. Kerr have been elected active and Edward H. Butler and C. W. Matheson associate members of the Automobile Club of America.

On Tuesday, January 6, Dr. S. S. Wheeler gave a lecture, illustrated by numerous lantern slides, before the Automobile Club of America, the subject being "An Automobile Trip Through France, Germany and Austria."

The Automobile Club of America has appointed Clarence Gray Dinsmore its representative on the Gordon Bennett race commission. This commission, which is composed of delegates from the various organizations, will have the entire control of all matters pertaining to the race, as far as the American contingent is concerned.

the automobile movement in general. We are certain to have at least a few of the 100 mile non-stop contests again this year, so that such vehicles for which the long run would not be a suitable test would also be accommodated.

The two alternatives then would seem to be, a long distance contest, New York to Chicago, and several one day contests in the vicinity of the large cities, and a number of three or four day contests, starting and ending each day at a central point—a large city. The 100 mile non-stop runs alone, in our opinion, do not satisfy all needs. The proper way to decide this question of alternatives is to submit it to the manufacturers and proceed in accordance with the wishes of the majority.

American Ideas at the Paris Show.

Our attention has been called to the fact that a number of features in automobile construction heralded at the Paris Show as the latest improvements are really old American ideas, some embodied in cars now upon the market and others already abandoned. Three cylinder explosion engines, for instance, were first employed in this country. Water tanks with large tubes running through them, after the form of marine condensers, were used by a number of the pioneer American manufacturers, and mechanically operated inlet valves have been in use on American gasoline automobiles for a number of years. Finally mechanical current generators and make and break igniters, which are reported as having been shown in increasing numbers, were very early adopted in America.

American manufacturers are not receiving abroad all the credit that is due them for the introduction of new ideas in automobile design or the practical perfection of old ones. They have, however, to blame themselves in a certain measure, as the chief cause of this state of affairs is their aversion to the publication of details. It is held that the publication of details would encourage copying, but in view of the fact that the machines which have been most extensively copied have been the ones about which absolutely no details except of a general character were to be had from the manufacturers, this contention is hardly justifiable. Those who make up their minds to slavishly copy a certain vehicle will buy a model, and not go by more or less incomplete and irrationally reduced trade paper drawings. The best policy for those who have meritorious details is to "let their light shine" as soon as patent proceedings are well under way, in which case they are most certain to receive credit for what they have accomplished. The tendency in this respect is fortunately for the better at present.

The Brownlow Bill.

In our issue of December 24 we printed a slightly condensed text of the bill introduced in Congress by Congressman Walter P. Brownlow, of Tennessee, providing for the appropriation of national funds for the construction of improved highways. This bill has the support of the Automobile Club of America and of the American Automobile Association, and deserves that of everyone having occasion to make use of the common roads.

During the early part of the last century the United States Government made various appropriations for road construction, and a number of national roads were built out of these appropriations, including the "Old Cumberland Road." Later on disputes arose over the matter of raising funds for maintaining these roads, and as a consequence the Government entirely dropped the policy of building roads, with the result that for the last two generations the work of road improvement has almost entirely devolved upon the counties, and comparatively little has been accomplished. Recently, however, a number of States, notably New York, Massachusetts and New Jersey, have adopted road improvement laws by which the State shares with the counties and individual property owners the expense of road construction.

This co-operative plan has given excellent results, and it is now proposed to extend it so as to include the National Government as a co-operating factor, which is essentially the object of the Brownlow bill. Probably owing to the failure in Congress of a number of bills making appropriations for national roads, an impression has prevailed that it would be unconstitutional for Congress to make any appropriations for this purpose, but such is not the case. The Constitution especially authorizes Congress to "establish post offices and post roads," and inasmuch as rural free mail delivery is at present being rapidly extended, every improved highway would soon be comprised in a rural free mail delivery route, and therefore be a post road.

The United States at present enjoys the proud distinction of leading the w
almost every line of commercia
prise, and vast amounts are annual
in various lines of public impro
But in the matter of the improve
public roads, which has always c
ized eras of exceptional power an
perity in the history of nations,
sadly lacking. Whatever may
wealth of a nation in railroads, ca
urban means of transportation, it
portation facilities are not comple
out properly built and maintaine
roads. And the comparative lack
roads in the United States is th
keenly felt because of the genera
lence of its other means of commu
The country is just now passing
an era of exceptional prosperity,
may properly be said that in no o
could some of the surplus energy
nation be so profitably expended a
construction of good roads.

The Brownlow bill appears to
all possibility of any section of the
securing an undue advantage from
propriation of funds to which all h
tributed alike by taxation, since it
that no State shall receive in aid
construction a greater proportion
total amount appropriated than its
tion bears to the total population
United States. To further insure
distribution of the money appropr
bill makes provision that any polit
division of a State may apply for
ative aid in road building, so that
a State, owing to lack of funds to
portion of the cost, be handica
availing itself directly of the aid o
the bill, it may yet profit thereby
its political subdivisions are in po
spend money for road improveme

The interests of the automobil
ment are so closely identified wi
of the good roads movement tha
certain every automobile organiza
pledge its support to this bill. It
sincerely hoped that the passage
bill in Congress will not be de
prevented by party differences,
we may soon see the National Go
rendering active aid in the constr
good roads.

Seamless Drawn Tubing Gas Pipe.

It has repeatedly been observed t
pared to the best French produ
the automobile line, most Amer

chines, even those of the best known makers, show a certain crudity and lack of finish. This fact is even acknowledged by some of our manufacturers, who ascribe it to the alleged impossibility of obtaining proper materials of construction in the American market. We believe, however, that this is not the real cause, because certainly just as good tool steel, just as good gray iron castings and just as good bearing metals are obtainable in this country as anywhere else. However, the high grade materials are not as easily procurable in suitable form as some of the poorer ones and are, of course, also more expensive, though we believe in many cases the former is the chief reason why they are not employed.

In some cases also the previous training of the builder or designer largely influences the choice of construction, material and of methods.

Perhaps the most apparent sign of crude construction is the extensive use of common pipe fittings and long gas pipes on gasoline automobiles. Our leading manufacturers have learned to use for the exhaust and intake connections of gasoline engines seamless tubes of steel or brass, which can be bent in easy curves, saving much weight and largely obviating the danger of leaky joints and disconnections due to the vibration of the road. But the heavy walled malleable iron fittings are still only too common. There is, of course, a certain advantage in their use—that duplicates may be had at almost any hardware store; but the use of seamless tubing for connections, with union and flanged joints properly secured, almost entirely does away with the necessity of replacements. It is never well to have very long connections on a car, but a seamless steel tube with easy curves and union joints will certainly stand the vibration much better than an ordinary gas pipe. In fact, a gas pipe extending along the frame of the car for a considerable length is almost sure to be broken at one of the joints in a short time by the vibration, unless it is cut and a short length of flexible tube inserted in it.

What has been said of the advantages of seamless tubing over ordinary iron pipe applies particularly to multiple cylinder engines in which the connections are necessarily long. In a single cylinder machine when all the connected parts are located close together there is no particular objection to the ordinary fittings, if the work is well done.

The Paris Exhibition.

(Continued.)

By L. Berger.

Two vehicles were exhibited with electric transmission, the "Electrogenia" and the Mercedes-Lohner-Porsche.

In the Electrogenia the chassis weighs complete 1,430 pounds. The driving equipment is a vertical gasoline motor operating a dynamo. The whole is mounted on a sub-frame which is fixed to the main frame in front by a few bolts. An electric motor operates the rear live axle of the vehicle. A controller with resistances is interposed between the dynamo and the motor and is operated by a handle on a notched sector, according to common practice with electric vehicles. It is claimed that in this manner 75 per cent. of the power developed by the gasoline motor is transmitted to the driving wheels, while with ordinary mechanical transmission the efficiency is only 50 per cent.

The Mercedes-Lohner-Porsche (Fig. 1) is equipped with the same motor as the regular Mercedes vehicles of the largest size. The motor drives directly a dynamo located upon the frame of the vehicle in the place ordinarily occupied by the change gear box. The electric motors are located in the front road wheels, being of the type known as hub motors. An electric controller is inserted between the dynamo and the electric motor. A battery of eight storage cells serves to start the gasoline motor by means of the dynamo.

The ignition of the new Mercedes gasoline motors is arranged as shown in the accompanying sketch (Fig. 2). It is somewhat similar to the Mors. E represents the insulated spark terminal inside the cylinder and O the movable hammer inside the cylinder, which is operated from the outside by the lever K', which oscillates around the shaft H, having bearing in the wall of the cylinder. The two spark terminals inside the cylinder are brought in contact by the coiled spring *r*, and the motion of the lever K' when the spark terminals recede from each other is limited by the stop S. The sparking mechanism is operated by the cam C on the half speed shaft I. This cam acts on the cam roller G at the lower end of the rod B. This rod lifts the lever arm K whenever the raised portion of the cam

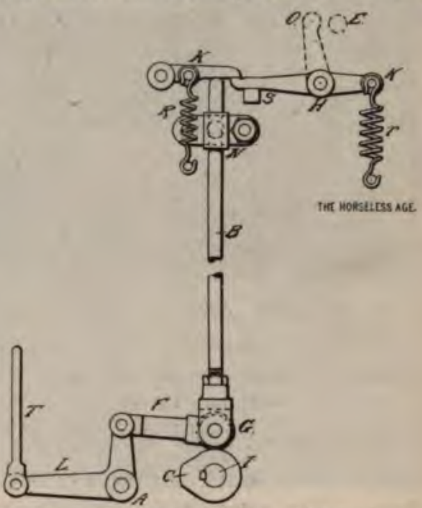


Fig. 2.—Mercedes Igniter Mechanism.

comes under the cam roller. Then, the lever K' being free to move away from the stop S, the spring *r* causes the movable electrode O to come in contact with the stationary electrode E. A moment later, when the raised portion of the cam C has passed the cam roller, the rod B drops down; then the coiled spring R draws down the lever arm J, which strikes the end of the lever arm K', thus causing the electrodes O and E inside the cylinder to break contact and thus produce a spark. The rod B is guided at N. The time of ignition may be varied by means of the link M, the bell crank L pivoted at A and the rod T, which permits of varying the relation of the cam roller G to the cam C.

The new Mercedes radiator, which will be fitted to the 1903 model, is shown with all dimensions in Fig. 3. It is, of course, of the cellular type, and is composed of

Fig. 1.—Lohner-Porsche Combination Gasoline Electric Car With 28 Horse Power Electric Motor in Front Hubs.

Fig. 6.—Front View of Three Cylinder Panhard, Showing Cooler.

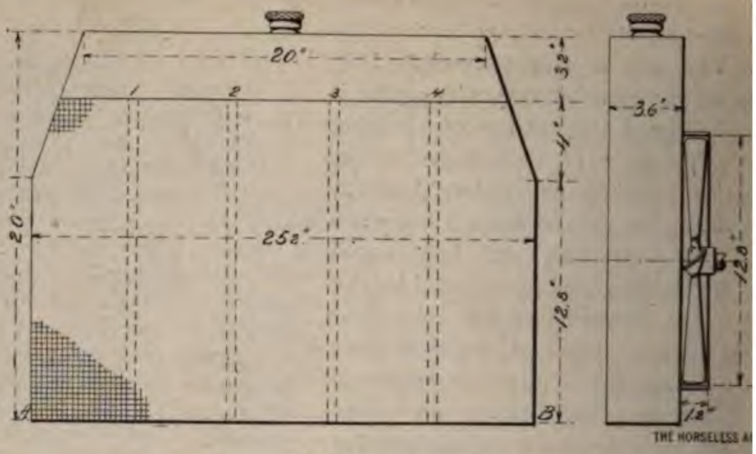


Fig. 3.—Mercedes 1903 Radiator.

square tubes measuring .28 inches across the outside surface and .22 on the inside. There are ninety tubes across the cooler at the bottom from A to B. The total water capacity of the radiator is 7 litres (about 2 gallons). The water circulates readily between these tubes in a vertical direction through the passages indicated by the dotted lines marked 1, 2, 3 and 4, and also horizontally, although less easily. The fan is 12.8 inches in diameter, and is surrounded by a circular case to increase the draft. The 2 gallons of water and a radiator of the dimensions shown are said to be sufficient for a motor of 28 horse power.

In the new Serpollet 40 horse power racing vehicle, the "Torpedo," an illustration of which appeared in The Horseless Age of December 31, the normal steam pressure is 10 kilograms per square centimetre, or about 130 pounds per square inch. This pressure may be raised to 50 kilograms per square centimetre, at which it is claimed the motor will develop 200 horse power. The rating of the motor is 40 horse power, and its weight 140 kilograms, or 312 pounds. The boiler weighs 440 pounds and the machine complete 1,870 pounds.

In Fig. 4 is shown a new form of safety motor starting crank with which a back kick is said to be impossible. The crank is mounted on the shaft A as usual. The handle is indicated by C^2 and is supposed to be perpendicular to the paper. It disengages from A in the usual manner when the motor runs up to speed. If a back kick should occur, which would tend to bring the point M towards C^2 and to diminish the angle between the two levers, it will be seen that the ends of the two levers in contact with each other pass by each other, compressing the spring E. The spring E is of sufficient tension to overcome the compression of the motor. The device seems to embody a very practical principle and it is to be hoped that so[me] American firm will get out something si[m]ilar.

Fig. 5 represents a device for testi[ng] spark plugs. It is provided with a pressu[re] gauge M and a window R. The plug is i[n]serted at B and air is compressed in t[he] device by an ordinary bicycle pump attach[ed] at P. The air pressure may be pumped [up] to any desired degree and when the spa[rk] plug is set in operation the spark can be o[b]served through the window. The same d[e]vice may be used for testing the engi[ne] compression.

Fig. 6 shows a front view of the Pa[n]hard three cylinder machine and particula[r]ly the new cellular radiator. It will [be] noticed that this radiator differs conside[r]ably in shape from the Mercedes radiat[or] and that the bonnet has not been construc[t]ed to conform with it in outline. A rese[r]voir for water is located on top of t[he] radiator proper and is filled through a

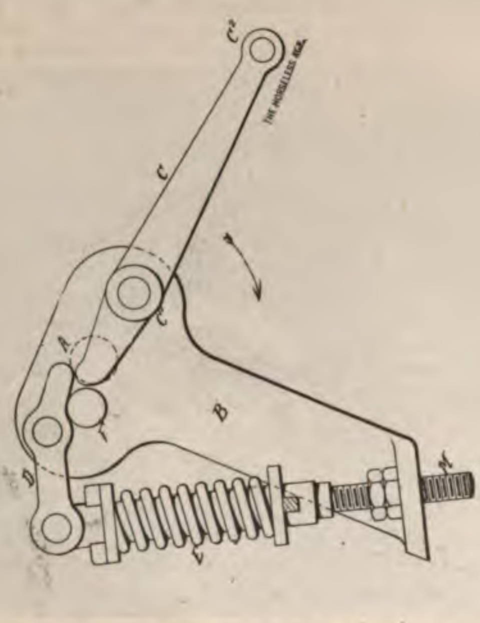


Fig. 4.—Safety Starting Crank.

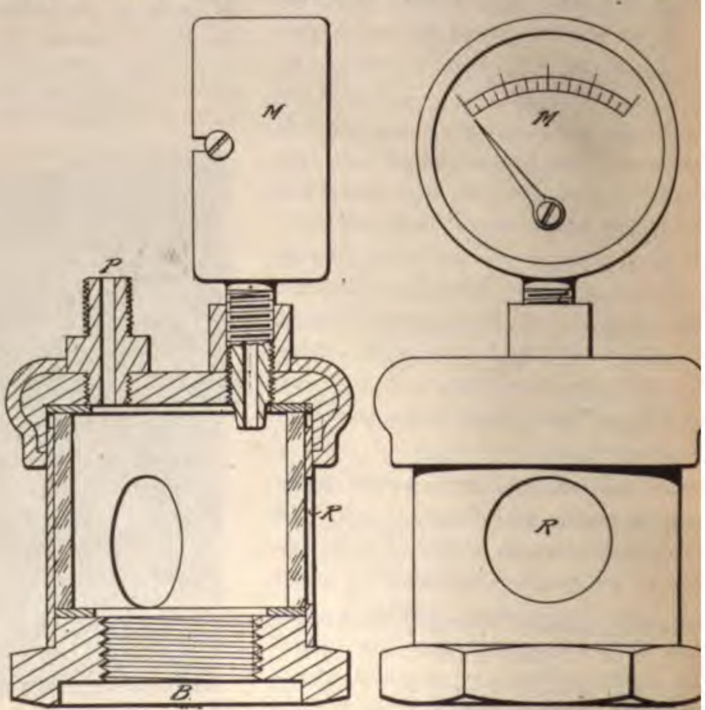


Fig. 5.—Spark Plug Tester.

G. 7.—The Mors Cellular Water Cooler.

Fig. 8.—New Panhard 40 Horse Power Chassis.

g on top, as is usual. It will be d that the tires of this vehicle are led with a peculiar shape of flat tread. new Mors radiator, of which we already shown several outline draw- is represented by the photograph 7). The photo shows that the cells s radiator are oblong in section, and quare as those of the Mercedes and ard. A new arrangement has been ed for affixing the lamp brackets. are indicated by E E in the illustra- and are, as shown, attached to the top radiator. The rotary pump P is lo- below the radiator and is driven from ngine by spur gears, as already noted. 8 illustrates the new 40 horse power ard chassis. This machine is equipped the new four cylinder Centaure motor brass water jackets and mechanically ted inlet valves. These valves are lo- on the near side of the engine and be seen in the illustration. The cut shows very plainly the oil pipes lead- from the multiple oiler on the dash- to various parts of the engine. The hand wheels N N on the steering wheel for controlling ignition and ad- on of gas, which are one of the im- ments in this year's Panhard models, lso very plainly seen. It must be said the whole construction looks compar- ly simple.

Electric Vehicle Company will have xhibition at the New York and Chi- shows a coupé which has been made eet the demand from doctors for a ortable electric automobile. The body bles a miniature brougham, and all ntrolling apparatus is within the com- ent. The coupé is guaranteed to 40 miles of travel on one full charge e battery.

LESSONS OF THE ∴ ROAD ∴

Pill Peddling Per Automobile—A Dream?

By Roscoe N. Jackson, M. D.

As I have written one account of my experiences with the automobile, I will speak more of conclusions. Of the experiences I may say briefly that I bought the first car in Minnesota; one of the first models of steam wagon, which arrived on Christmas Eve, 1899, nine months after I ordered it and five months after I made the first payment. I had the usual quota of mishaps—burnt boilers, burst gasoline tank, explosions, paint consuming fires, etc., besides getting stuck in mud not half as deep as advertising photos showed the machine negotiating. Worst of all, I buckled the front wheel (wire) in some sand and took a header, breaking a collar bone and a few ribs, but with it all I am a thorough believer in the auto.

For the last three summers I have depended upon it altogether, up and down our steep bluffs and in the timber as well as on the prairie. My horses are put out to pasture till cold weather, but I have to use horses then, as my steam wagon is useless in a country where the temperature runs much below freezing. The water pipes are all exposed and freeze. It would seem an easy thing to enclose the exposed parts, and I see one of the late wagons has done something toward it, but I should judge that while the machinery is protected from mud, etc., the water pipes are still exposed.

ADDITIONS AND IMPROVEMENTS.

My wagon weighed when I got it 650 pounds with the tanks full. Since then I have added a water heater, utilizing the exhaust steam, and a hand pump, and this summer I lengthened it one foot. It rides so much better, you would not think it the same wagon, and it takes no more power than before. I wish it were another foot longer, making it 6 feet 8 inches, which is short enough for easy riding and handling.

WEIGHT.

The first wagons were very light. Then came a constant call for a heavier wagon that would not "look like a buggy with the horse removed." Then, Yankee like, we went to the other extreme, and put out, and are still putting out great battering rams, animated juggernauts that cannot be stopped much inside of half a block.

Now there is a reaction setting in, and the light wagon is being put out, and I notice that those who have used both are deciding in favor of the light one. As for my wagon I never thought it too light. I have never broken any part of the machinery or running gear except spokes.

TIRES.

The reports of all contests, tourists and others, show that tire troubles constitute about the largest item of expense and anxiety. I see some are coming back from a 4 inch to a 2½ inch pneumatic. Is this an admission that the narrower tire is better suited to dirt roads? If now they would discard the pneumatic altogether and put on a narrow—1½ inch—solid rubber tire they would save some of that expense, and all the anxiety, and get a wheel that would not skid like a wide tire. Then note the resistance. Four wheels, with 4 inch tires, give 16 inches to push through mud, sand, slush or now. This is about equal to dragging a large plow. Four wheels, with 1½ inch tires, give 6 inches of displacement, and that is enough, for be it known that the wide tire, just as much as the narrow,

goes down through it all, to terra firma, to get sufficient grip to overcome the inertia of the wagon, else there is no traction. All belief in a wide tire "riding on top" of a loose road will be dissipated by a fair trial. It is presumptuous to ask a pneumatic tire to withstand the shock of a ton projectile launched against it constantly at a three minute clip. The same is true of a wire wheel.

WHEELS.

Wheels are being made larger, several getting up to 36 inches. This is as it should be. It is reasonable that the years of experience that have taught carriage makers to make wheels 40 inches or more in diameter should not be ignored, and auto experience is teaching the same lesson. The light bicycle wheel to the bicycle with its light load and a good surfaced road, but the large wheel, 40 inches is my vote, for the heavy vehicle, with heavy load and rough road. This will not drop into every little depression, and will go through deep mud and sand, and still have quite an angle of leverage above the surface.

Then if it be a narrow tire it will readily follow in the ruts the farm wagon leaves, with no danger to tire, and no diverging spokes to be ripped out by frozen mud or stones in the side of the rut. More than once have I been obliged to dismount to pound up and remove frozen or half frozen chunks of mud that held the spokes as in a vise, and if you happen to strike such a spot with some momentum your spokes will snap like fiddle strings, irrespective of their size, the wheel maker to the contrary notwithstanding.

THE IDEAL WAGON.

In my opinion this should be of 8 to 12 horse power, air cooled motor, with all working parts thoroughly protected from dirt, with a large wooden wheel with about 1½ inch solid rubber tire, standard tread, long and low built, and weighing about 1,000 pounds. This wagon is not made yet that I know of, although I understand one firm is to bring out something similar with a 30 inch wooden wheel and pneumatic tire in the spring.

Oh, gentlemen, why don't you give us what we want? Give us a wheel large enough to roll and ride easily. When you equip us for bad roads we know we can negotiate the good ones, but when you give us a good roads racer we find, alas! that that is all it is—a "good roads" machine.

We must have a machine that will eliminate the horse on bad roads as well as on good, in winter as well as in summer. You never will negotiate deep roads with a small wheel and wide tire, nor stand a Northern winter with a water cooled motor, although a steam wagon should be as easy to equip for cold weather as a locomotive.

It is said the pneumatic tire is necessary to take the shock of the machinery. What are your springs for? Put on longer, easier springs and a good, hard rubber tire and you can run the wagon just as fast as you will soon be allowed to run it. Why struggle longer to build 40 mile an hour machines when the authorities everywhere are cutting us down to a speed the horse can beat? Don't you know that if this keeps on much longer we will all stop buying autos for the simple reason that we aren't going to be allowed to exceed the speed of a spavined mule, unless we go and hire a race track? Touring is getting to be a luxury for even a rich man, for at every town one is liable to be arrested for violating some local regulation—thanks to your damnable catapults run by goggle-eyed record breakers. It might prove a good thing if no one were allowed to wear eye shields, for then when his speed made him weep he would be obliged to slow up.

I think I hear someone say: "Why don't you make a wagon, you seem to know so much about it?" My answer is that the drawings are made and I will make one soon unless some manufacturer does. If I do make one it will be guaranteed to run continuously, through a foot of sand or snow or mud, and when the public find it will do it, it will sell. Robin Damon wants one and so do you. It will be more than 4 feet 8 inches long and less than 4 feet high and it will not have a lot of noisy, power absorbing planetary gear. It will be all enclosed and be quiet in operation and go just as well at 40 degrees below zero as in August. A dream? So far, yes; but any manufacturer can make such a wagon if he wants to, and will when the public demand it. Just at present anything that will go down hill on a pavement finds a buyer. Competition and an educated public will soon correct this, and the proper machine and proper price will come, and we will have an all the year round machine that will come into such general use that we users will be able to influence legislation. Then again, horses will soon get accustomed to them and it is for us to deny ourselves somewhat and help educate the horse. Of course the horse owner knows how idiotic the horse is, and has always taken his chances of being killed by him, yet in spite of that the owner, instead of estimating the horse as the fool that he is, has naturally opposed everything that scared him—the steam car, the bicycle and the trolley. The one thing that scares the horse most of all, the steam threshing outfit, the farmer has never kicked on because it is devised for his benefit. But all these things have their right to be, and have found their place. So will the auto when legitimately used. There is no denying that the present use of the machine seems to be largely for the pleasure and sport of the wealthy who show too little regard for the rights of others. We, as physicians, in the proper use of an auto as a business vehicle ought to be able, more than anyone else, perhaps, to disarm unreasonable opposition and finally secure a proper recognition of its rightful use upon the highway.

The Use and Abuse of th[e Auto]mobile

By H. C. Harris, M. [D.]

For the past two or three yea[rs I have] periodically had the "auto feve[r...] good cold bath of a lot of roar[...] valves so placed that they were [...] maliciously hidden but required [...] dismantling of the motor for repa[...]es that demanded the curves of [...]tionist for their adjustment, elect[...] of the flimsiest sort, all served to [...] temperature for the time, and i[t was not] till the spring of this year that [I found a] motor that I was willing to car[...] support, in sickness and in hea[lth...] machine I adopted is a light gas[...] about, and I had it but a very [...] when my first motor illness pre[...]self—the necessity of taking the [...] out of the motor. A proper adju[...] my circuit breaker spring promp[...] this attack, but I recognized at [...] the necessity of a thorough and [...] investigation of the outfit of wh[...]pected so much. I knew my pri[...] was as familiar to me as the gr[...] on my summer clothes, but a[...] knowledge of the parts of your [...] only be gained by a personal s[...] thought, wrench and hammer. [...]tomobile driver should make t[...] This knowledge I secured, and m[...] served me in avoiding annoyanc[...]pense.

I have driven my motor over [...] and have made a repair on the [...] twice. First the circuit break[...] broke. Then a stud on the mai[...] came out and the bearing fell ap[...]

Now, while I have done little [...] on the road, I have done consi[...] my stable, especially as to loose [...] nuts. Since adopting a double or [...] it is the exception rather than th[...] I find myself falling apart; but [...] look and take nothing for grante[...]

About the time of my purchas[e ...]quaintances bought each a car of [...] manufacture. Their experiences [...]haps would indeed break up [...] school. Everything was consta[...] and falling apart, and the engin[...] like a serenading party on electi[...] there were frequent tows home, [...] machines were for sale after a [...] months' use, or rather abuse. T[...]tors were cared for by the mec[...] regular agencies, one in New [...] the other in New Jersey; the Jer[...] tells me that his motor was [...] turned to him running smoothly [...] he was always told "it is all rig[...] result is that the outfit is cast [...] sale," and his report is that yo[...] keep the —— thing together tw[...] hours.

The other has gone the roun[...] New York garages, hoping to [...] one who could fix the thing for [...] least, especially as more than [...]

been expended for repairs in about four months. On this list we note a charge of $25 for one rubber gasket and twenty hours' time, for which job $2.50 is a most liberal allowance. Again we note a bill of repairs on this carriage from October 8 to November 7 inclusive of $117.72. Surely this experience would soon drive the most ardent enthusiast out of the business.

A word as to the class of repairs we frequently get from the so called professional mechanic, who is sent to adjust our troubles. These are the men who cause the dissatisfaction that so largely now exists among owners of automobiles, and who are aggressively destroying the efforts of the manufacturer to place on the market as nearly as possible a foolproof machine. While we concede that the person sent understands the principle and parts of the motor, the work is so slovenly done as to almost approach criminal carelessness; the repair attempted is incomplete, and many things which should have been done are left undone; consequently the first or second ride after this alleged "all fixed up" means trouble, annoyance, disgust, expense and, possibly, profanity.

My personal experience has been totally different from that of my friends, which I attribute to a knowledge of my motor and proper adjustments at all times. The occasional professional attention my motor has demanded has been by a thorough and able mechanic, I remaining till the machine was in order, paying my little bill and riding home happily.

My carriage has been upon the road daily for the past six months, and outside of the cost of a new rear sprocket and chain, which went wrong at about 2,500 miles, and repairs to tires, I have paid out less than $10. And if my experience this winter permits the daily use of my motor I will in the spring sell out my stable and depend entirely on this new mode of transportation.

A Disappointed User—Wants Instructions.

By Dr. A. O. Pitcher.

From the first mention of a horseless carriage I have wanted one. Last spring I attended the Automobile Show at Chicago, and after spending two or three days examining the different vehicles I decided to buy an air cooled gasoline automobile as the machine best adapted to a physician's use in the country and on country roads. When my machine was delivered I was told by the agent that it was simplicity itself, but when I received the instructions I concluded otherwise.

I found a multitude of terms and names I knew nothing of. The anatomy was far from and beyond my understanding, but before the machine arrived I had committed to memory the instructions. When it came I looked at it, and knew nothing of what I had read. I could not apply my written instructions, for the names of the different parts I did not know, as I was not an engineer or machinist. I felt that the task was great to be able to run, care for and repair on the road, so that confidence would give pleasure in running the machine.

I tried with local help for some time to work the machine, but it would not work satisfactorily, so I put it aside and wrote to the company of my troubles, and they sent a mechanic from Chicago to set me right. He worked two days on the machine, on valves and springs, had it all apart, and got it to running very nicely; but I had lost confidence and a kind of fear of something about to happen killed all the pleasure of riding in it. Another thing against me has been the wet season and the bad roads. I could not run it on the slippery roads on account of skidding. The only long trip I made with the machine I was overtaken in a rain storm and had to leave it and walk back to the railroad station, through the rain and mud, and come home by a roundabout way, of about 50 miles, when I was only about 12 miles from home. My runs have been made in fear of accidents, scaring teams or of doing injury to someone on the highway, and for that reason, and because it is not in order, the auto now stands in the barn, a beauty to look at, but disabled on account of some defect in a valve. I cannot get any compression or power, and I will have to send it to the repair shop before I can use it again.

To sum it all up I am disappointed in the practical use of the machine for a physician.

SUGGESTIONS.

It is useless to detail all my troubles and disappointments, but I will make a few suggestions which I think will be of benefit to buyers and manufacturers.

1. Send a man out with a machine, give practical instructions and show how to take apart and put together the various parts.

2. Give a book of instructions showing all the various parts named and their location marked in illustrated plates, and the directions as to how to take apart and put together and repair in plain language.

3. Instruction in regard to proper lubrication and when to lubricate, indicated by arrows on illustrated plates. I suggest this as most physicians are not mechanics and as a rule do not make it a study, and we are too busy to take a regular course of instruction in mechanics and engineering; so a handbook should go with each machine for ready roadside reference. I have felt the need of such a book ever since I bought my machine.

The pleasure is great when the machine is in proper order and running nicely, but the vexations are also great when you stand on the roadside and do not know what to do for the lack of proper advice and instructions from the makers of the machine, and I feel that an auto in the country is too complicated a piece of machinery and too liable to get out of order and too hard to repair to be of practical use to many physicians.

First Few Weeks with an Automobile.

By G. C. Lewis, M. D.

After having used my own horses for several years and then livery for several years, I yearned for an automobile. So last summer I bought one, a park trap, so that two or four could ride as desired. I had never tried to drive one before and went according to printed directions. I had a gasoline engine man go with me on the first trip. We started to see a patient 4 miles north of town on a Friday—an unlucky day. After we were out of town a short distance, it dawned upon us that it was show day. The biggest show on earth was to exhibit in town that day. We wished we were back home, for it was necessary for us to stop every few minutes and let some horse go by, and sometimes the automobile would stop with no horse in sight. Strange to say, everyone that drove by would ask the same question: "Are you stuck, Doc?" I answered: "Oh, no! Just waiting for you to get safely past." We started early in the morning, and it was noon when we arrived at my patient's home. On the way back we made good time, as the teams were off the road.

During the Chautauqua in a neighboring town my family concluded they would like to run over and hear one of the concerts in the evening. Accordingly, my wife had put up a fine lunch of fried chicken, etc., and my son and I gave the automobile all the water and gasoline it wanted to drink. My son, daughter and my little three year old girl joyously mounted the rear seat, my wife and I occupying the front seat. My wife exclaimed: "Isn't this fine!" Away we started, but we didn't get outside of the yard fence before it stopped. I didn't say anything for a while, but just meditated. I examined the thing carefully and thought the driving chain was too tight. I pulled off my coat and hat, took out the tool bag, crawled under it and worked like a Trojan, sweating more than in any surgical case I ever had in my life. In mopping the sweat with my shirt sleeve the grease, oil and dust had so begrimed my face that when I crawled out my wife exclaimed: "Why, papa, is that you?" I didn't say anything. I just meditated. Finally we pushed the automobile back into the barn and I used a pound of soap and several buckets of water to take off the grease, ate a magnificent lunch, retired early, and enjoyed heavenly dreams—thought I was under the automobile, working all night. Since then, however, we have had some very enjoyable rides.

One day last August I used it as an

ambulance. A young man, 5 miles from home, was run over by a wagon, and the right thigh in middle third was broken. After setting the limb we laid him on the rear seat, with board extension, and, with four others, made the run of 5 miles to his home in twenty minutes. It rode as easily as a Pullman car, and never disturbed the patient in the least.

Another experience I had. The printed directions said after the engine was started and you had taken your seat to press your foot slowly on the fast lever for a short time, then push it forward suddenly until it was caught tight. One day I went out to the barn, oiled up and started the engine, mounted the seat and started with the foot on the fast lever. As I passed out of the door I suddenly forced forward the lever, and the automobile bounded out of the barn like a race horse. In an instant I was off the driveway, running zigzag over the lawn, doing my best to dodge the maple and evergreen trees. Recollecting the brake lever I forced it forward and came to a standstill. My wife had been doing some fancy work on the veranda that afternoon; when she saw me rushing around among the trees like a wild man she dropped her work and exclaimed: "What in the world are you doing?" I answered that like her "I was trying to do some fancy work."

A LUCKY SPILL.

The worst feature about the automobile was its tendency to frighten horses. One experience I had I shall never forget. A friend of mine and I had been 6 miles out in the country to see a patient. On our way back we passed several teams successfully, but suddenly came upon a country woman with six children in a canopy top surrey. She was holding a small babe on her lap, and a six year old son was driving. The other children were on the rear seat. When the horse saw us he suddenly whirled around. The woman with her babe jumped out, but the others were thrown out as the carriage upset. I had stopped the automobile, but the engine kept running for several minutes. I called to my friend to run for the horse, which had torn away from the surrey, but got tangled up in the harness on a barbed wire fence. I ran to the children. All were crying at the top of their voices. I was glad to hear them, as I was fearful some had been killed. I hastily examined one after another and found a few bruises on each child, but no bones broken. A lot of groceries were spilled. I set the children to gathering up the sugar, telling them to eat lots; we gathered up the sack of flour, etc., patched up the harness, hitched up the horse, gave them a few dollars for further repairs and sent them on home. I made up my mind I would never take another risk like that; so when I got home I had an electrician put in a cut off so I could stop the engine, as well as the automobile, instantly.

My Experience and Some Reflections.

By Dr. D. H. Dean.

I have now been using an automobile in my practice for almost a year. I bought my machine the first of February, 1902, and have been using it almost constantly, having traveled nearly 4,000 miles. I use it daytime or night, rain or sunshine, and the remarkable part of it is I have never had a break or delay of any kind, except a few days one week when I was troubled in locating a short circuit in the battery.

Why I have been so fortunate I don't know, unless it is due to careful watchfulness of my machine in its every detail. After I purchased it I spent three or four days, what time I could find outside my regular duties, studying the booklet of instructions and every part of the machine. Before I undertook to operate it I could picture in my mind every movement and turn in starting, running and stopping. Every morning I spend twenty or thirty minutes in carefully looking over the machine to see that everything is right—battery connections secure, nuts tight, all bearings well oiled and plenty gasoline and water in the tanks. I take nobody's word for it. This is about all the attention my machine requires for my average daily run.

A question to be considered by the physician before purchasing is whether it is a profitable investment for him. The price asked for a good machine is high, and seems to most of us so extravagantly high that it can't be a paying venture. So far as cost of fuel and oil and repairs necessary from natural wear of machine are concerned, there is a great saving over that of keeping horses and rigs equal to the working power of the automobile. But if one is so unfortunate as to meet with many accidents, causing much breakage and numerous delays, then it will most likely prove an unprofitable investment. But the improvement in the construction of machines that will come with each year, and the more thorough study of the management on the part of the driver, will dissipate all these drawbacks.

Then again, as to whether or not it pays depends on the amount of travel necessary in the daily rounds. The physician whose business requires him to keep two or three horses certainly will find a well made automobile a good investment; not only because it cuts out the expense of the horses, but in the saving of time to devote to the office, and no physician can estimate what this is worth to him in this age of sharp competition. I make runs into the country of from 3 to 8 miles out with an average loss of time from office of one hour, a saving of at least one hour, and this extra time in office means quite a sum to be credited to the automobile—enough that I can safely say my machine is a good investment.

Experience with Home Made Automobiles.

By G. W. Smith, M. D.

About seven years ago I got the idea that I would be able to profit by the use of an automobile in my practice. I soon found, however, that owing to the bad roads in this locality I could use the vehicle, as then manufactured, not more than three months a year. I then looked around for a factory that would undertake to build me a machine that would travel on any road, but got little satisfaction. After some further thought on the subject I decided to build a machine myself, according to my own ideas. I began with well made plans, material carefully selected, with a good machinist to do the work and a well equipped shop, but I soon found that what at first seemed an easy matter was really the most difficult undertaking of my life.

For the running gear I used four 40 inch wooden wheels, trussed front and rear axles, reach rods with a pivot joint to the front axle, a differential gear for both front and rear wheels, and a third differential gear for the central shaft, between the differential gears on the axles. The differential gear on the central shaft received its power from the motor through an ordinary transmission device. The driving motor was a small gasoline engine. When the machine was finished the most one could say for it was that it was a handsome looking vehicle, although it ran nicely on smooth roads. This, of course, was disappointing, as it was intended for rough roads. Unfortunately it became uncontrollable one day, and I was compelled to run it against a cable and a telephone pole to stop it. This wrecked it completely.

I began to rebuild at once, using the main plan of my former invention and what material I could of the wreck. I shortened the front axle and made several other important improvements. The pivotal driving connections of the front wheels, which in the first machine consisted of equal gears, cut so as to run at an angle of 90 degrees with each other, were now made to run at 120 degrees. This driving gear has proven to be all that could be expected. I have run it in mud and sand, over ploughed ground, through the brush, over logs and in ditches, and it seems to be as good today as it was the day it was finished, save the wear from usage. All the wheels being used as drivers, and driven positively, but independently, from one central driving gear, seems to add greatly to its strength and durability.

With this truck I first used a gasoline engine, and had many a pleasant ride. It seemed that nothing but pleasure could be my harvest, but in time my troubles began one by one.

I received a call one day about 1 o'clock to visit a patient suffering from a serious

pain in the heart. The distance was about 12 miles over a route that I had not traveled for some time. I invited a friend to accompany me. It was a very cold day, but the sun was shining. The roads were fairly good. Most of the distance we ran at the rate of about 15 miles per hour, with no other trouble than a short stop or two, caused by a frightened cow or horses. In about fifty minutes from the time of starting I was at my patient's bedside. On account of the gravity of the complaint I stayed with her until nearly dark. By that time the mercury stood below zero. My engine started somewhat reluctantly, but after getting ready we hastened away at full speed, hoping to reach home before dark. My engine worked so poorly that I was compelled to run on the low gear on all sandy roads. My companion asked what the matter was, and I told him that it was so cold I was compelled to run slow for fear of breaking a gear. This explanation was satisfactory to him, as we were both shivering with cold. Where the roads were good I ran as fast as the power of my engine would allow, but at length, when about 6 miles from home, my troubles came all at once. We met a man with a spirited horse, and I was compelled to stop the engine before we could get the animal by. This took all of fifteen minutes, and during this time the engine got cold, so that although I cranked it till I was wet with sweat, it would not run. I worked on it for three long hours, but it did not budge. My companion meanwhile was running up and down the road to keep warm.

At length I became fatigued and disgusted, so I hired a farmer to pull us to town. On account of this and other trouble that I had with my engine and the noise that it made, I removed it and placed a steam engine and boiler on my truck.

I find that steam power is the most reliable. It is the best for starting when in a tight place, and would be the best by far if it was not for the loss of time in generating steam in starting, the freezing of the steam gauge and water pipes in cold weather, the inability to hold steam on a cold day, the filling of the water and gasoline tanks and the influence of the wind on the burner, causing it to back fire. This last trouble I overcame by arranging the exhaust so as to cause a current of air through the flues. The physician has no time to stop on the road and fill the water tank when he is going to see a patient, and for this reason I burned out a boiler one hot summer day. The feed pumps sometimes give trouble, but the worst of all is the filling of the water tank. All of these troubles cause me to return to gasoline power.

The Thomas B. Jeffery Company, Kenosha, Wis., are reported to be planning large additions to their factory, and to have closed an order with John Wanamaker for 150 machines.

...COMMUNICATIONS...

A Blaze of Unknown Origin.

Editor HORSELESS AGE:

After a successful summer's campaign my automobile, which is of a heavy gasoline type and a popular and well known make, having a two cylinder horizontal opposed motor, was placed in the barn to rest until the balmy breezes of spring and good roads should again invite it to journey forth.

Yesterday was January 1, and after reading of various successful attempts to operate gasoline automobiles through the winter, it occurred to me that it would be no more than proper to show the public that my automobile was an all year round machine; consequently, new batteries, which had just arrived the day before, were installed and an attempt made to start the machine. The results were a trifle out of the ordinary; it occurred to me that I had never seen any record of exactly the same experience as mine in THE HORSELESS AGE and so thought I would record mine to discover whether it was unique or whether others regarded the experience as too trivial to mention.

After installing the batteries an attempt was made to turn over the engine, and as it seemed to stick a trifle harder than usual a little extra pressure was brought to bear. It was then discovered that the soft copper pin which holds the pinion operating the water pump had been sheared off, proving that the water pump was frozen up, although every effort had been made to properly drain the water out of the automobile. A new pin was inserted and after a little application of hot water the pump was thawed out, so that it turned easily. After two or three attempts to start the machine it was decided that it would be much easier to pour a liberal amount of hot water on the carburetors, rather than to spend further time in turning the crank. This was done and upon again turning on the gasoline we found the float in the back carburetor to have stuck so that a little gasoline ran over into the pan under the machine. More adjusting got the back carburetor to working properly; then more hot water was applied. Upon turning the engine over once or twice a few explosions were had, when, greatly to my surprise, I discovered the back carburetor to be in flames and the fire dropping to the floor, where it set fire to the gasoline in the pan. Having owned a steam machine for two years such a little matter, although entirely unexpected in a gasoline machine, did not disconcert me. The fire on the floor was smothered out by an old carpet, and two or three bucketsful of snow placed on top of the carburetor prevented the flame reaching any place where it would do harm. The fire was allowed to burn itself out, but no further attempts were made to start the engine. I had turned the engine over several times with the compression relief valves open before turning on the spark, but at the time the trial above mentioned was made the relief valves were shut. The only way in which I can account for the carburetor catching fire would be that the water poured on the carburetor had in some way soaked the insulation of the wire so that instead of the sparks jumping across the terminals of the spark plugs they found an easier way from some point of the insulated wire to the carburetor that had been covered with hot water. This may not be the explanation, but it seems to me that no other could account for the sudden bursting into flames of that carburetor. M.

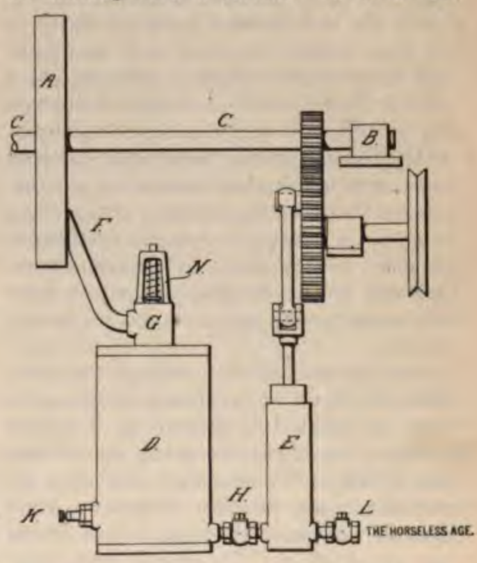
[We presume that you have jump spark, and in that case your explanation is probably the correct one. The moral is that gasoline leaks should be avoided as far as possible, and no attempt should be made to start the engine until the leak is stopped and the gasoline removed.—ED.]

Explosive Turbines.

Editor HORSELESS AGE:

I would like to know if you or any of the readers of THE HORSELESS AGE can tell me whether the gasoline turbine is a practical thing or not.

The sketch which I send is a plan I had for making such a turbine. A is a De



Laval type of steam turbine, mounted on a flexible shaft C C with bearings B B. D is the exploding chamber; E, the force pump; K, the spark plug. The gas comes in at L and is forced into the exploding chamber D by pump E, where it is fired, say, a thousand times a minute; outlet valve G opens outward, but is held down by a spring, so that no gas can pass unless the pressure is great enough to lift it—50 pounds per square inch, or whatever compression is desired. The exploded mixture passes out through the nozzle F to the blades of the turbine, which is supposed to run at a very high velocity.

I think the only difficulty of such a tur-

bine would be in the divergent nozzle F, which in a steam turbine is tapered according to the pressure in the boiler, but in this case the pressure is always changing, so that good economy cannot be obtained. Such a turbine would not need any water to cool the chamber D, nor any flywheel, but chamber D must be as close to the blades of the turbine as possible, so as not to lose any heat. H. S. Powell.

[Many explosive turbine ideas have been patented, but to our knowledge no automobile has ever been built with such a motor. There are undoubtedly grave difficulties to be met in the design of such a device. The speed must necessarily be very high, and much of the power would therefore have to be wasted in gearing. The large periodical changes in pressure would be a feature likely to conduce to trouble; lighting back into the pump cylinder has to be counted with, etc.—Ed.]

Covered 4,000 Miles and Towed to the Shop But Once.

Editor Horseless Age:

Perhaps the readers of the Doctors' Number will be interested to hear of a day's experience with my 7 horse power single cylinder gasoline runabout. The day was a beautiful one in November. I started at 8 o'clock in the morning and drove to my office, a distance of 18 miles, over a road of varying degrees of adaptability in exactly an hour and a quarter.

For the next six hours the car stood at my door while I was busy with an unusually large number of office patients. At 3 o'clock I turned the crank and started on my run home over the same road that I had taken in the morning. Arriving at home a few minutes after 4 my wife reminded me of an engagement that we had to go to an evening reception at the house of some friends about 2½ miles distant. Arrayed in our evening clothes we kept this engagement, going to and fro in our machine.

Not yet having had enough, and bethinking myself of two other receptions in town to which I desired to go I invited a doctor friend to accompany me. There was a beautiful moon, but soon after we started a heavy mist set in and we could scarcely see more than the length of the car ahead of us. In exactly one hour, however, we reached our destination and spent some time enjoying the pictures of an excellent art exhibit. From there we went to a large medical reception where we remained until 11:30, then started on the homeward trip. The mist had not cleared away, but it was more dense, if anything, almost entirely obstructing our vision, and drenching our clothes. We reached home in safety at 12:30 and slept the sleep of the just.

To my mind there are at least two points of interest in the above narrative. The first is that it is possible for a man to spend six hours at work in his office, attend three large receptions, and drive over 70 miles in one day, and the second is that no stop was made during the various stages of the drive for any purpose whatsoever, notwithstanding the fact that nearly half the distance was covered in the densest kind of fog. Incidentally I may add that I have driven my carriage over 4,000 miles, and have been towed to the shop but once.

G. Hudson-Makuen.

A User's Specification for a Gasoline Vehicle.

Editor Horseless Age:

I have run a steam carriage something over 5,000 miles and a gasoline a little more than that distance. I now want another gasoline machine, to carry two to four people, with not less than a 7 horse power engine, and rig not to weigh over 1,400 pounds. I want wood wheels, single tube tires and wheel steering. The engine cylinder, head and explosion chamber must be cast in one piece, so there will be no packed joints to get leaky. Both the exhaust and intake valves must be mechanically operated, must be upright, and both the valves and valve seats must be easily and readily removable, so that the seats can be taken out of the engine to be reground. I am done with the jump spark and its troubles and want touch system. I want the time of ignition automatically controlled by the speed of the engine—not the speed of engine controlled by the time of ignition. I want the speed of the engine to be controlled by a throttle which will throttle both the gasoline and air. It must not throttle either one without the other, but both at the same time and in correct proportions. I want the engine crank to be balanced independent of the flywheel, the latter to be balanced by itself. I want a better transmission than anything I know of. Have used about six kinds, supposed to be the best in use, the best of which are far from perfect. The clash or shifting gear now most in use is far from satisfactory. I am fond of the autos I have; they are worth all they cost. Can you tell me where I can find the machine I want?

Auto Ride.

The Float Feed Principle.

Editor Horseless Age:

The remarks of a user in a recent issue regarding the float feed vaporizer seem to unjustly criticise this simple and efficient device. For some unknown reason a number of statements to this same effect have appeared in various magazines, apparently originating abroad, the argument being that at low speeds the float feed device does not feed sufficient liquid and at high speeds it feeds too much, thus producing a variable mixture and one that varies inversely as the requirements. In reply I wish to say that such action of a float feed device is due to a faulty arrangement of the parts and not to an inherent defect in the mixer itself, for it is possible to so arrange a float feed mixer as to overcome this result or even produce the reverse effect, i. e., get too much liquid at slow speeds and not enough at high speeds, and since this is possible, we believe it possible to produce a mixer of such design that it will give an approximately correct mixture at all speeds. We realize the difficulty of securing perfect results automatically under varying conditions in any device and therefore use the term "approximately correct," and by this use we mean a mixture suitable for daily use up hill and down, on good roads and bad, fast and slow without adjustment. The method of doing this is quite simple and consists in varying the level of the liquid in the float chamber automatically so as to require a greater lift of gasoline at high speeds than at low. This nearly all float feeds do to a limited extent, for the float must fall in order to admit more liquid, but most designers have aimed to secure a constant level, whereas this is not the thing desired. If considerable float movement is required to admit the proper amount of gasoline, this varies the gasoline level, as will readily be seen, while if the gasoline passages are not abnormally large the friction therein can retard the passage of liquid substantially as the friction in the air passages retards the flow of air. Just what produces the desired result is hard to say, but we have had mixers which produced too rich a mixture at low speeds and not rich enough at high speed without a complicated governing apparatus, although the writer patented a spring valve arrangement several years ago for admitting an increased quantity of air at high speeds.

The crying need in automobile design today is greater simplicity, and any movement toward more complexity should be avoided, unless there is a decided and well proven advantage.

Chas. E. Duryea.

A Prospective Buyer

Editor Horseless Age:

The bulk of current automobile literature comes from the pens of engineers, owners and operators. A brief communication from a representative of the grand army of prospective buyers may be novel, and possibly not entirely devoid of interest.

Have I the automobile fever? Well, you will be better qualified to answer the question after reading what follows. My life consists of two twenty-one year periods: the first largely devoted to the preparation for, and the second to the practice of medicine. Now you know who I am, what I am, and, for that matter, how old I am. Since this is my first offense in the way of a contribution to automobile literature, the introduction does not appear superfluous.

At the 1896 State Fair held in my native city I viewed with intense interest two types of the automobile, products of a now well known firm. During the six years

which have elapsed I have observed the slow but certain development of the horseless vehicle, never losing an opportunity to learn what I might from every possible source. Being one of that uncertain class known as self made men, and also enjoying membership in good standing in a still broader class, which embraces all those not blessed with a superabundance of worldly goods, I have not contributed to the automobile industry as I should had my lot been otherwise. I regret knowing that some of my class envy the wealthy. This is wrong, and savors of narrowmindedness. When my wealthy neighbor parts with one, two or more thousand dollars for a horseless vehicle, knowing all the while he will not get value received, my admiration, not envy, is excited. Every dollar of money so expended goes just so far toward developing an industry from which I fully expect to profit in due time. My attitude of apparent selfishness is at least pardonable.

I have heard luxury defined as "something we do not want until we see others have it." We doctors got on peacefully, pleasantly and some prosperously long before the automobile was invented. Now, seeing others have them, our attention is naturally attracted, and we also desire the pleasure and profits of possession.

The horse is a success and not one would be so foolish as to deny it. Of course he has to be fed, groomed and shod. He frightens at the cars, does not always stand hitched well, has the colic, goes lame, and the bit may short circuit with his teeth and he may run away, but centuries of education to these admitted shortcomings tend to make us unmindful of them. Notwithstanding all this, the horse is a recognized success in all climates and seasons. Can we say so much for the automobile? There is but one answer—"No." Again, could we expect the horseless vehicle to be made perfect in a little more than a decade? To this question the same answer applies. To me, recognized progress in this work has been nothing less than marvelous. To me it further appears that we will be compelled to wait only a short time for a practically perfect automobile. Some may be sufficiently ignorant and enthusiastic as to claim so much for the present construction, but the erroneous idea will be promptly and thoroughly removed by ownership and operating, and by following the advice embodied in a familiar quotation: "Ask the man who owns one."

That human nature prevails in the owner of an automobile no one has a right to question. It is quite natural therefore for an owner to confess with much reluctance imperfections in the vehicle he has selected and purchased. There are exceptions to this rule, and, as one, I wish to cite Mr. Damon. At first one might do this gentleman an injustice by misjudging his attitude. To me his several articles which have appeared from time to time in this valuable educatory journal have not only been free from objection but laden with wholesome knowledge. I dare say not a single prospective buyer will be side-tracked by any of the facts he has so conscientiously set forth. I maintain it is better to let us prospective buyers know the worst, then we will be prepared for trouble, and our disappointment will be accordingly tempered.

The automobile is not yet perfected for certain purposes. As a summer vehicle for pleasure in its present state it is not far from being practical, and serves an excellent purpose. I understand full well manufacturers have in the past had no difficulty in disposing of their output such as it was; hence, I presume the neglect shown toward any effort to produce a machine for practical every day use. I called the attention of one maker to a useless and avoidable eyesore on his product, and his response was, in substance, that so long as he could not keep up with orders no additional expense would be made to cover up eyesores. In due time competition and a settled condition of the business of automobile building will correct many such evils, and force makers to superior work; in other words, the fittest will survive as it should.

That automobiles are not yet sufficiently perfected to satisfy the physician's demand, I verily believe. Three months ago one could scarcely drive a block in this city without meeting or being passed by at least one of the forty or more automobiles owned in Columbus. Today in my drives I saw one only in use. This same day I have talked with two physicians who are owners, and learned that one had "froze up" and the other had lubrication trouble, and both machines were out of service. The question arises: Were those people whom I observed in September all driving their automobiles just for pleasure? Were not some of them making use of their machines for business purposes? If the latter, why are they not now in use? The answer is simply that the winter machine, the every day in the year machine, is not yet made. From my viewpoint I think it unwise and wrong for manufacturers to say at present, in substance, that all seasons are the same to their product.

I have some money which, if you will pardon the expression, I am fairly itching to exchange for an automobile. I am even willing to make the exception to a rigid rule of business, and accept in exchange what I know to be less than value received. I do not even desire to displace or replace my horses. I do not demand of the maker a perfect machine. However, I do want a vehicle which will not require a major portion of my income to maintain, and one which will approach at least the usefulness of a good horse.

For my purpose, which is not touring the country, but for daily use as a ready, convenient and comfortable means of transportation such as is required by a practitioner of medicine, I believe a medium weight gasoline machine best suited. Fully appreciating steam as a power, and knowing full well that the last word has not been said in its favor, I nevertheless cannot harmonize the same with the winter season. The electric vehicle is, in my opinion, fully abreast with others in point of perfection, but as yet has the disadvantage of too short a radius. Excluding steam and electricity, the internal combustion power is determined upon for reasons set forth above. The designer of my machine need not hold fast to the lines of the ordinary carriage, since the less it appears like a horseless buggy the better I will be pleased. Just why a so called automobile, in reality a road locomotive, a veritable machine first, last and all the time, should be made to look like a horseless buggy is a mystery far too deep for my understanding.

In making a bow after my first appearance in automobile print, I express hope that the Damons, Cloughs and others will keep up the good work, and thereby contribute toward my intelligent selection of a 1903 automobile. E. Z. Mark.

"A Personal Ideal."

Editor Horseless Age:

Responding to Albert L. Clough's interesting article in the issue of December 31, describing a personal ideal, I would like to state some of the points as to which I agree or differ with him.

While agreeing with him as to strength and quality of materials and construction throughout, and especially of the running gear and brakes, I do not think it necessary for a vehicle intended to carry only two people and to be run within reasonable limits of speed, to be so large or heavy. A wheel base of 6 feet and standard gauge should be ample.

His idea as to springs strikes me as correct, and I would add that in my opinion it would be better to use thinner leaves, and more of them.

By all means use roller bearings for the live axle and front wheels. If the differential is put outside of the springs a tube can encase the rear live axle, and only two bearings are necessary. This will not only make it an easy matter to get at the chain but also to enclose it, which latter is really essential.

My own inclination, based on use, is to solid rubber tires of ample dimensions for the weight to be carried. I believe in large wheels, as they ride easier, and, in conjunction with smaller tires, raise little dust.

I can see no reason for making the steering gear irreversible on a vehicle to be run at ordinary speeds, and doubt its advisability. A sufficiently reduced rack and gear arrangement is not at all tiring, and has advantages.

The arrangement of brakes meets with my own views exactly. I also am in favor of the double opposed cylinder engine, but cannot agree with the idea that it is not

adapted for use in front under the bonnet as well as further back; both methods of using have their advantages. With a lighter vehicle it would hardly be necessary to have so large an engine, even with the extreme speed limited to 1,000 revolutions per minute. But why use mechanically operated inlet valves? It is an added complication, and the valves are subjected to much greater stresses than the automatic. The valves should be large, but not any larger than necessary, for obvious reasons. I cannot agree with the idea that cylinder and head should be cast integral. A packed joint is an abomination on an internal combustion engine, but there is no difficulty with heads fastened with a ground joint. With the head separate it is an easy matter to get into the cylinder back of the piston, which is sometimes necessary to take out pieces of broken ignition plugs and to clean out the carbonized oil. Besides, I can see no advantage in having the head water jacketed; on the contrary, as it allows a quicker cooling of the exploded charge and therefore loss of power, I think it a disadvantage.

I am decidedly opposed to an adjustment of the ignition automatically, according to the speed, as this precludes getting the advantage of advance ignition just when most needed; for I have found that even when the motor was running very slow in taking a grade I could get a great deal more power by advancing the ignition up to about one-eighth revolution of the crank shaft, and thus save going on the second speed. With automatic regulation I would be losing power all the time in such a case.

Why use two coils where one will answer every purpose? Of course it is not as bad as having two carburetors, but one answers every purpose.

Why control the intake by the inlet valves? It must certainly be a more complicated arrangement than doing it with a throttle valve, and the result must be identical. Probably the best way to change the speed and power of the motor is by a combination of the exhaust and ignition control.

His conception of a transmission tallies with mine, but it should have roller bearings, with hardened steel sleeves throughout.

There is no doubt that for general use some positive method of lubrication, according to speed, should be devised, but an improperly adjusted mechanical oiler is about as bad as a multitude sight feed oiler not adjusted properly to the grade of oil used.

There should be no necessity for the vehicle weighing more than say 1,200 pounds if intended for only two passengers, but if intended to carry more at times additional weight could well be added.

St. Russ.

[While most of the points considered by our correspondent touch on debatable ground, we are convinced that he is mistaken in regard to automatic control of ignition. There is for each speed of the engine a point of ignition which will result in maximum power. And an automatic governor would always cause the ignition to occur at this point. If he has been able to accelerate his engine while running slow on a hill the only explanation is that ignition occurred too late—later than it would have with an automatic governor properly adjusted.—Ed.]

A Trip into the Yosemite Valley.

Editor Horseless Age:

Thinking a letter of the experiences of a "wild and woolly" Westerner, a cattle man at that, might be interesting to some readers, I shall join the experience meeting this evening and tell you of some of my joys and sorrows with the capricious horseless carriage.

I will commence by stating that my experience has not been a path of roses, for I have had all kinds of trouble. Neither my early training nor my feminine friends kept me from using language at times not appropriate for the Sunday school or prayer meeting. But with all my annoyances with the fickle auto I enjoy it more today than ever before, and have learned from bitter experience that the trouble generally lies more with the operator than the machine.

Of course, I admit that all machines give trouble; some more than others, but it is hardly ever necessary to be towed in or hung up on the road any length of time if you are thoroughly acquainted with your machine.

Though I have plenty of horses, both riding and driving, I could not resist buying an automobile after taking my first ride in one. Robin Damon states it but mildly when he says a man with the auto fever is worse than a victim of drink. Some may think Mr. Damon is talking through his Panama in his articles on automobiles, but no one after running an auto 5,000 or 6,000 miles in all kinds of weather and over all kinds of roads will distrust him.

My home is the second nearest railroad point to Yosemite Valley and I saw many of the well advertised little runabouts and big road rollers pass through my little town on their way to the Wonderland. How they glided along our level roads with their polished bodies and shining nickel! But "what a difference in the morning" when they returned. Few ever made the trip, and the full truth was never told in the catalogues of the few that did.

The experiences of some of the machines caused me to look with favor upon the light runabout, as it seemed the big fellows were not what they were cracked up to be. I had long been a subscriber to The Horseless Age, and before taking the final leap I wrote to every company advertised in it selling automobiles.

The letters, circulars and catalogues came in due time, and each told of the superior merits of its machine. All that was necessary to do with any of them was to push a lever gently or turn a crank and the machine did the rest.

I was in total bewilderment what to choose, when a light gasoline runabout came into our town, operated by an expert, who was out establishing agencies for the Pacific Coast branch of the company building this machine. It had come a long way, through mud and rain, and had made a splendid record. Of this I was aware, for I had kept close watch on its movements.

The machine had not been in town more than twelve hours before I owned it. No little tot with his first red wagon was ever more happy than I. I, of course, felt quite proud of the fact that I was the first owner of an automobile in the whole county.

All went merry as a marriage bell for a while, though I ran it over 500 miles the first week I owned the machine. Little troubles happened now and then, but they amounted to nothing, as I always went to the expert, who remained in town a week, and he very willingly set everything right.

At last he left, and all kinds of trouble followed. Not, however, until four of us started with two machines for Yosemite Valley. It is only about 85 miles, but up grade nearly all the way. The last half is a toll road, kept in very fair shape, but the first 40 miles is something terrible. In some places the road passes through streams where the water almost covers the 28 inch wheels. There is also deep mud to contend with, and occasionally dust 8 inches deep on a 12 per cent. grade. We knew all this before starting, but it did not daunt us.

June 10 found us gliding and careering along toward the great Wonderland. The first few miles was over level plains, where we could put the machine down to an 18 mile clip, but we soon came to the hills, when the low speed clutch was thrown in and the grating of gears commenced, which hardly ever ceased except on a down pitch.

It will be useless for me to go into detail concerning this trip with the time I have, but will state that neither machine ever reached the valley. Not because they were not capable of climbing the grades, but we took no extras along. We had but a week's leave, and could not wait for the parts to come from San Francisco, which would take several days, as they had to come part of the way by stage. We took the stage into the valley and spent a few days, and when the parts arrived repaired our autos and returned home.

There was one automobile in the valley, a steam rig. The operator told us he had been two weeks making the 85 miles, because of waiting for parts. This same gentleman took the first automobile into the valley. His picture may be seen in the company's 1901 catalogue in several different positions. In one place on the Fallen Monarch, the largest tree in the world; in another place he is shown on the

Dr. Carhart's Steam Vehicle.

tom flange are especially suitable, for the body sills may rest on this flange and conceal the side beam at the same time.

B. H. G.

An Early Doctor's Steam Carriage.

La Grange, Tex., December 21.

Editor Horseless Age:

I herewith hand you photo of my steam buggy "Spark," built at Racine, Wis., in 1872. Pneumatic tires were then unknown, and such a thing as ball bearings had not been thought of; nor was oil used as a fuel to produce power. I used hard coal, and had a boiler made by the Buttons, fire engine manufacturers, of Waterford, N. Y.

After my buggy was built the State of Wisconsin offered a prize of $10,000 for the steam road wagon that would accomplish certain conditions. A. Frand, of Oshkosh, Wis., who at that time had charge of my steam buggy, built the steamer "Oshkosh" and took the prize.

J. W. Carhart, M. D.

Success Depends Upon Little Things.

Editor Horseless Age:

I was the first in this country to get into trouble with an automobile. Like some others of your readers, I've had about all the troubles one ought to have. Still, I'm in to stay, for I have hopes that "some time" in the near future some firm or individual will recognize the fact that the "1,000 and not the 1" is to be catered and listened to in the final construction of an automobile that will serve the practical and daily purpose of the said 1,000. Faulty construction and carelessness in details about sum up the whole thing, I think. My errors have no doubt been numerous, but I'm always willing to pay for them, and perhaps I ought to be charitable toward the other fellow. Success or failure depend upon little things, and manufacturers, in my opinion, have not attended to the little things quite as well as our good money should merit. First a steamer, now a gasoline carriage. Which do I prefer? Gasoline, by all odds. I'm thoroughly well convinced I have a good carriage, but I filled in the details and made it so. B. F. B.

New Clubhouse of the A. C G. B. and I.

The British Automobile Club, which now claims to hold numerical supremacy among the automobile clubs of the world, some time ago found it necessary, owing to its rapid growth, to remove its headquarters to a more spacious locality and secured new premises at 119 Piccadilly, London. The new clubhouse was opened to mem-

Entrance Hall.

Smoking Room.

on December 4 last. We reproduce with some photos of various rooms in new clubhouse for which we are in-ed to Messrs. A. J. Campbell & E. r, photographers, 17 Cheapside, Lon-

n the ground floor of the building is grill room with silver grill. A rich Tur-carpet, plain red, tapestry curtains, and emely comfortable oak armchairs, with s and backs upholstered in morocco, n the chief furnishings of this room, ch runs from the back to the front of house. Besides, there are coffee tables, ons, etc., of oak, with other usual equip-ts to be found in a first class dining n.

he chief room, the smoking and reading lub room, is on the first floor, also run- from the back to the front of the build- Covered with fire green Kirman carpets, n green tapestry curtains to match, e are luxurious settees, easy chairs, and king chairs, scattered about in free and groups, all upholstered in sealing wax morocco. Handsome Spanish mahog-tables, book tables, etc., shelter numer-periodicals, books and photographs of ters automobile, to satisfy the varied es of the most ardent lovers of the eless vehicle.

djoining the clubroom is the writing n, furnished similarly to the former.

he hall and staircase are entered from stibule opening into Piccadilly. The is entirely covered with a very fine ey carpet in a rich red coloring, the carpet being to match. Smoking s in oak, with shaped wood seats and upholstered in morocco, a Chesterfield with deeply sprung seat in morocco everal oak smoking tables give the en-e hall a pleasing appearance of com-

e bedrooms, in the upper part of the ouse are comfortably furnished with bedsteads, good bedding, commodious robes, with sliding trays and drawers, es the other necessary equipments to und in a first class club bedroom.

e Automobile Club of Great Britain Ireland is most progressive in its pol-as it has recently acquired very well n livery stables situate just at the of the club premises. Several thou-pounds are to be expended in the al-ion of these additional premises to them for the storage of the motor les of the club members. The large al staff which is required to carry out ork of the club as a society of encour-ent will also be housed in these prem-where there will further be provided ious bathrooms, a small gymnasium he use of members, mess rooms and ing rooms for members' mechanics, a small workshop, with the necessary The following photos show the dining , the reading room and committee respectively, and together the photos a good idea of the fine appointments e premises of the club.

NEW VEHICLES AND PARTS.

Pierce 1903 Models.

For the 1903 season the George N. Pierce Company is manufacturing two styles of motorette and a medium weight touring car fitted with a 15 horse power double cylinder De Dion engine. This car is modeled on French lines adapted to American conditions. The under frame is of heavy seamless steel tubing thoroughly trussed and reinforced, with four cross stays brazed into heavy lugs on the side tubes. The motor and transmission gear are carried on an independent angle steel frame, so that any springing of the under frame cannot affect the alignment of motor and gear. In addition to this there is a flexible connection between the motor and transmission box. The flywheel is located outside the crank case and forms the single cone clutch. The change speed gear is of the Panhard type and has ball bearings. The power is transmitted to the bevel gear drive on the rear axle by a flexible shaft with universal joints. Wheel steering is provided, and all three forward speeds and the reverse are obtained by one lever on the steering column.

The wheel base is 81 inches and the tread 4 feet 6 inches. The weight machine without supplies is 1,530 p and with supplies 1,650 pounds. The cle has wood wheels 32 inches in dia with 3½ inch tires and ball bearing inch balls) on the rear axle a the front wheels. The body is sup on four long semi-elliptic springs. hub brakes are provided and one tra sion shaft brake, all double acting. brakes interlock with the friction so that when any one of them is a the engine is first disconnected aut ically. The water tank is placed in and close to the engine, so as to the resistance to be overcome by th culating pump to a minimum. Shou pump for any reason fail to opera water will keep on circulating by th syphon action. The car has a rem tonneau for two persons and a d front seat. Spaces for baggage and are provided under the seats.

Fig. 2 herewith is a side vew of th 6 horse power Stanhope motorette, a following illustrations show some of tails. This machine is of the m weight type, weighing 900 pounds tanks empty and 1,000 pounds with filled. It has a wheel base of 70 inch a wheel gauge of 54 inches. The len the machine over all is 8 feet 6 inche width over mud guards, 5 feet 8 inch width of seat, 39 inches, and the hei seat from ground, 43 inches. Wood lery wheels are used of 28 inches dia running on ball bearings and shod inch G. & J. double tube tires.

The running gear is of peculiar co tion. The motor and transmissio are supported by a tubular steel

Fig. 1.—Pierce 15 Horse Power Tonneau.

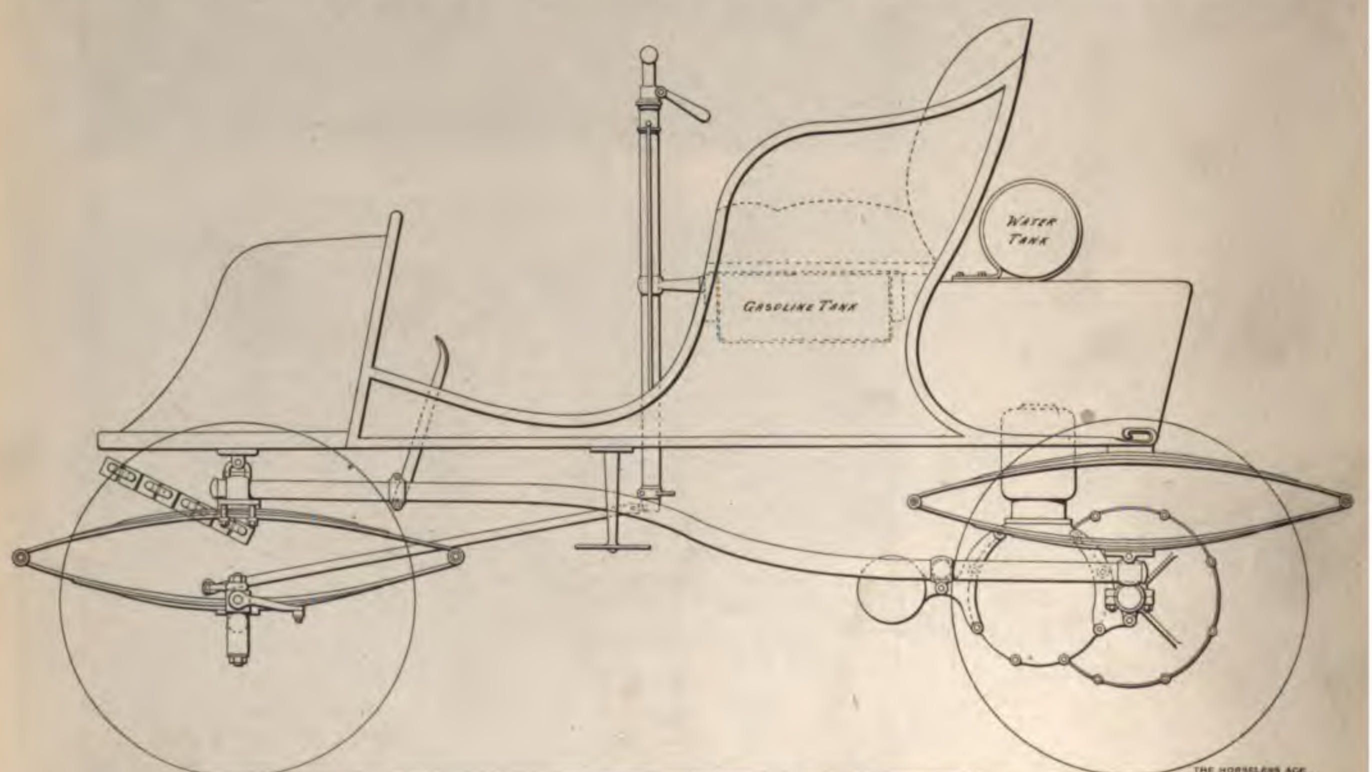


Fig. 2.—Pierce 6 Horse Power Stanhope Motorette.

which is attached directly to the tubular axle at the rear, and in front is supported by two full elliptic springs attached to the front axle tube. The body is supported at the rear by two full elliptic springs and in front is hinged to the under frame. This type of construction admits of a direct spur gear drive at the high speed, and the gears are kept running in an oil bath in a dust-proof case, which insures the highest efficiency of transmission.

The motor is a vertical single cylinder of 3 9-16 inch bore and 4 5-16 inch stroke, running at a normal speed of from 1,200 to 1,400 revolutions per minute. It has a heavy crank shaft and more generously proportioned bearings than are usual with this type of motor. The motor is of the usual high speed type, with internal flywheels, automatic intake valve and high tension electric ignition, with mechanical trembler. It is of the company's own manufacture. The arrangement of the motor and its various appurtenances is illustrated in Fig. 3. The carburetor C (Longuemare) is of the constant level spraying type, with float. The gasoline tank H is of copper and has a capacity of 4½ gallons, which is claimed to be sufficient for a run of 100 miles. It is located below the seat, as shown in Fig. 2. The cooling water is carried in a cylndrical tank J at the back of the seat, made of copper and of 6 gallons capacity. The circulation of the water is by thermo-syphon action and the cooling of the water is facilitated by a tubular radiator T composed of eight ⅝ inch tubes 14 inches long; these are located below the frame in front, being arranged in a single plane at an inclination, as shown in Fig. 3.

Referring again to Fig. 3 it will be noticed that a tube extends lengthwise centrally through the cylindrical water tank and that the air drawn in by the engine has to pass through this tube. This insures the air being heated in normal operation to a practically constant temperature. The muffler S is also indicated in this figure and will be seen to be of a common and simple type. The lubrication of the engine is effected on the splash system, oil being fed to the crank case by a hand pump, of which an illustration is shown in Fig. 4.

This pump is built into the sheet metal oil reservoir A, which is 5 inches wide and 5½ inches high, being located near the vertical seat board. The oil capacity is about 2 quarts. B denotes the tubular pump barrel, which extends through the reservoir at an angle. In this barrel is located the piston C on the piston rod D, to the end of which is fastened the handle E. The piston rod passes through a cap to the pump barrel, by which it is guided. The pump is provided with ball valves, F being the suction valve and G the discharge valve. The latter is held down to its seat by a spring. The discharge passage of the pump is connected by the union H to the pipe K, which leads to the crank case of the motor. The handle of the pump is in convenient reach of the operator and the latter may replenish the oil in the crank case while the vehicle is in motion by giving a few strokes to the pump.

THE TRANSMISSION GEAR.

The change gear provides direct drive on the high gear, a hill climbing speed by sun and planet arrangement, and a reverse by chain and friction wheels. A horizontal section through the gear and part of the engine is shown in Fig. 5. The engine crank shaft A is connected to the transmission shaft B by the positive clutch C, so that engine and transmission shafts always turn in unison. This connection provides a certain flexibility, thereby avoiding binding in any of the bearings. Upon the transmission shaft is loosely mounted the steel driving pinion D, which is in mesh with the bronze gear crown E of the differential gear on the rear axle. Pinion D is formed integral with a radial flange F, on which are supported at opposite sides two studs, G and H, on which turn the planetary pinions which are in mesh with the pinion I keyed to the transmission shaft, and also with the teeth on the internal surface of the drum J. This drum has a bearing on the hub of the pinion I and is further steadied in running by another bearing in the disk plate K, which is bolted to the drum. The planetary pinions are thus completely enclosed. The outer surface of the flanges at the joint between the drum and disk plate form a brake surface, to which a brake band L may be applied. The outer end of the drum J forms a member of a friction clutch of the expanding block type, which is controlled by the shifting collar M and the lever N. A coiled spring O normally keeps the friction clutch disengaged. It is, of course, readily understood that when the friction clutch is thrown in the planetary gear is locked, and the transmission from the transmission shaft to the rear axle is direct through the spur pinion D

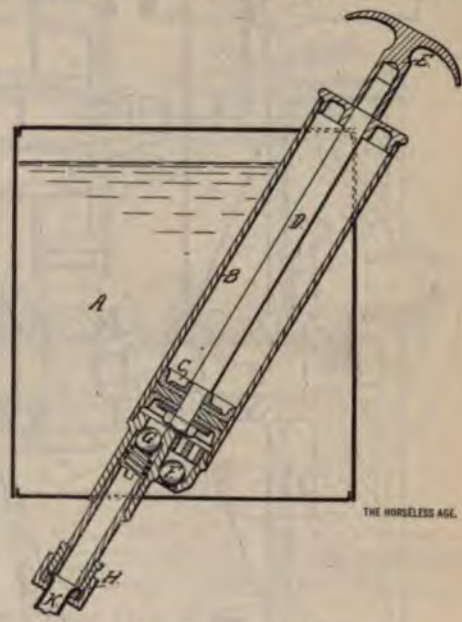


FIG. 4—OIL PUMP AND RESERVOIR.

and the differential gear crown E. When the gear changing lever is moved in the opposite direction the friction clutch is disengaged and the brake band L applied to the brake surface on the drum, thus causing the power to be transmitted through the planetary train, which gives a reduction of speed of 3 to 1.

THE REVERSE.

The reverse motion is obtained by means of a Renold silent chain passing over the chain sprockets P and Q, and by a set of grooved friction wheels R and S. The shaft upon which the sprocket wheel Q and friction wheel R are fastened is mounted in an eccentric bearing bushing which can

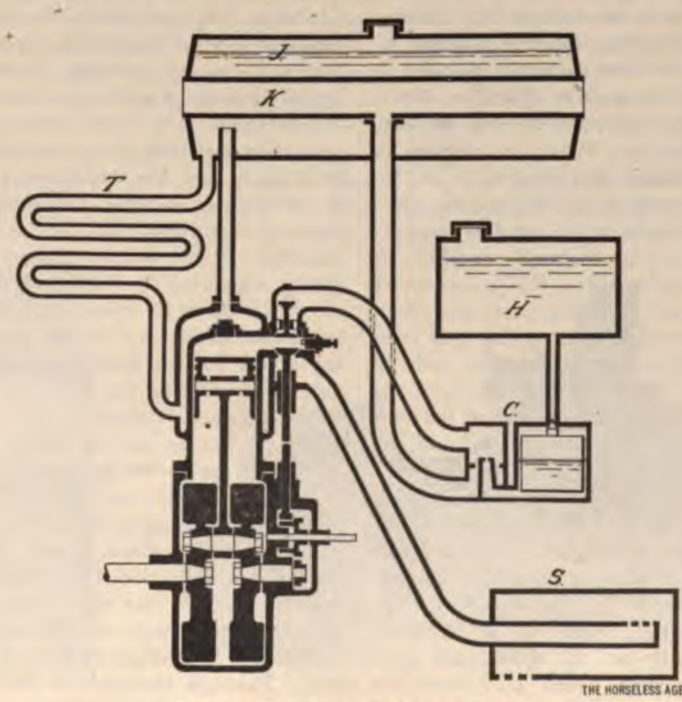


FIG. 3.—DIAGRAM OF CONNECTIONS.

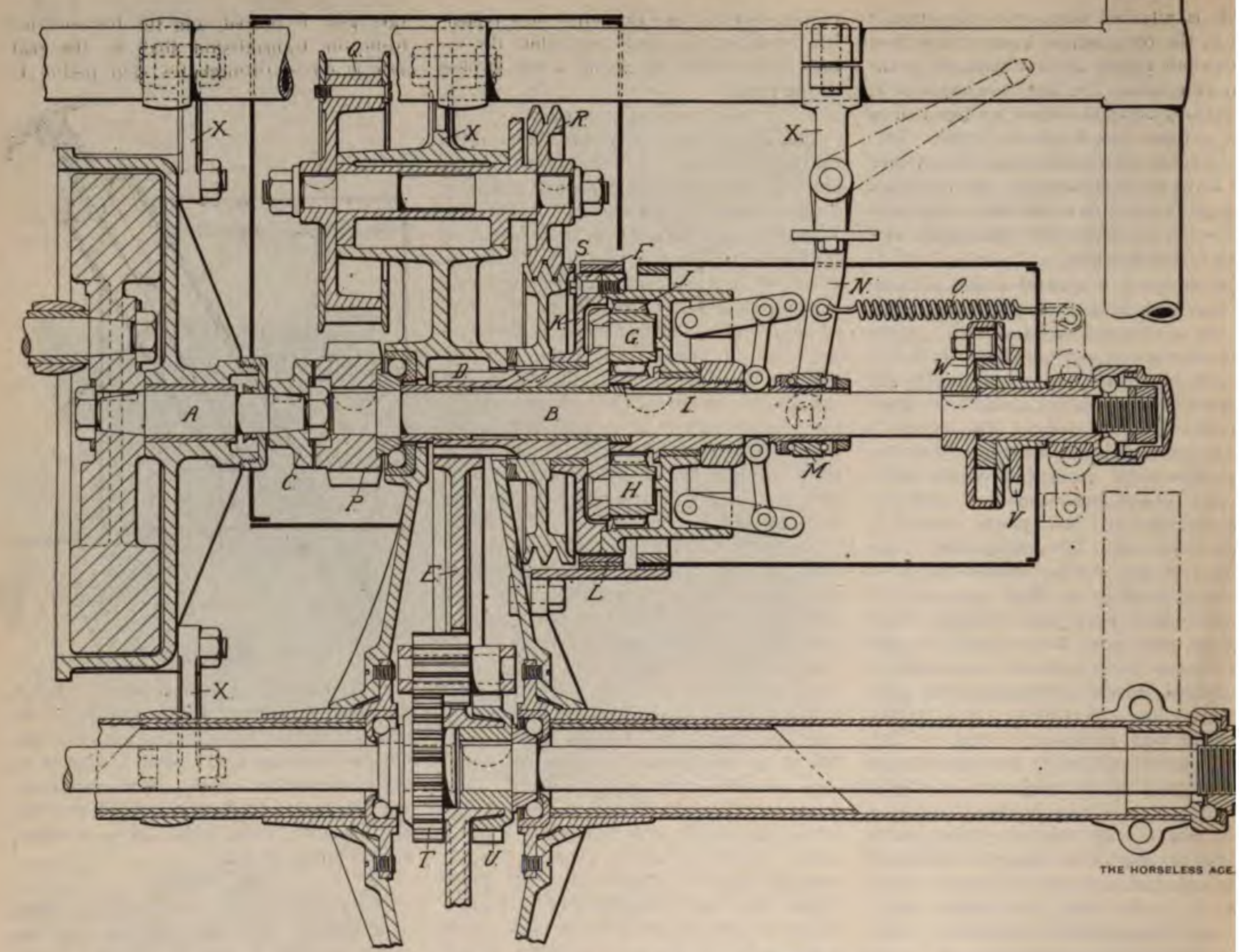


FIG. 5—HORIZONTAL SECTION THROUGH TRANSMISSION.

be slightly rotated by means of a pedal located near the brake pedal and therefore convenient to the operator, by which means the friction wheels are brought into driving contact. The friction wheel S is keyed to the spur pinion D and the chain sprocket P forms part of the positive clutch by which the engine crank shaft and the transmission shaft are connected. When the carriage is reversed the change gear lever is, of course, in a neutral position and neither the friction clutch nor the brake band is applied. The drive is then through sprocket P, sprocket Q, friction wheel R, friction wheel S, pinion D and the differential gear E.

The differential gear is of the spur type and of special construction. The web of the main gear is located centrally with regard to the face of the gear, and the hub of the main gear surrounds the hubs of the two side gears T and U. The planetary pinions are arranged symmetrically with respect to the web of the main gear. The differential gear is completely enclosed and the case is filled with cup grease. The rear axle is surrounded by steel tubes of large diameter and thin walls, which are reinforced internally at the differential gear end. The change speed and reversing gears are separately enclosed in sheet metal cases.

At the right in the change gear box will be noticed a sprocket pinion V and a planetary gear W, by means of which the motor is started, the reduction effected through the planetary gear reducing the manual effort required for starting. It will be observed that the transmission shaft runs on ball bearings. The engine and transmission gear cases are hung from the tubular frame by hangers and the transmission gear can be taken down without disturbing the motor, and vice versa. All the mechanism is mounted on the tubular frame, which is spring supported in front and directly by the rear axle in the rear. When the brake is thrown on or any of the gears engage the frame rotates slightly about the rear axle, thus reducing the shock.

The carriage is provided with a double acting rear axle, double brake, of which two views are shown in Fig. 6. The brake drums A of steel, it will be noticed, are attached to the wheel hubs. The brake comprises two bronze shoes, B and C, which are pivoted on a bracket D extending downwardly from the rear axle tube. A stud E projects parallel with the rear axle from a lug on this bracket above the reach connection. Through the end of this stud extends a guide rod F, which is fastened in the lug. Upon this guide rod there are two coiled springs, G and H, which ur normal conditions when the brake is no action hold the upper ends of the br shoes B and C apart and the shoes out contact with the brake drum. At the up extremity of the brake shoe C is pivo the lever I, which by a rod, not shown, c nects with the brake pedal shown in Fig At the upper extremity of the shoe B pivoted the eyebolt J, which has a sw connection with the lever I close to the ter's fulcrum. This arrangement give large leverage and consequently a powe brake.

The same illustration shows some of details of the rear axle construction. represents the housing of the ball beari L the bearing cup and M the cone. housing of the bearings is fitted inside rear axle tube O. The end of this tub surrounded by the bracket piece D, wh forms a support of the brake studs and a means of attachment for the frame t the latter being fitted into the portion The metal hub of the wheel is of pecu construction, as shown in the drawing, is fastened down to the axle by Wood keys. The ball bearings are provided w dust protectors S as shown.

The vehicle is steered by a lever fro centre post between the two passeng

either of whom can run the car. The speed lever, spark and gas levers are also manipulated from there. The slow speed gear can be used as a brake. The reverse gear is actuated by a foot lever adjoining the foot brake lever.

The handle for starting the motor is placed in a convenient position and a simple arrangement is provided for lifting the exhaust valve, entirely relieving the compression, so that starting is done with very little effort and great reliability.

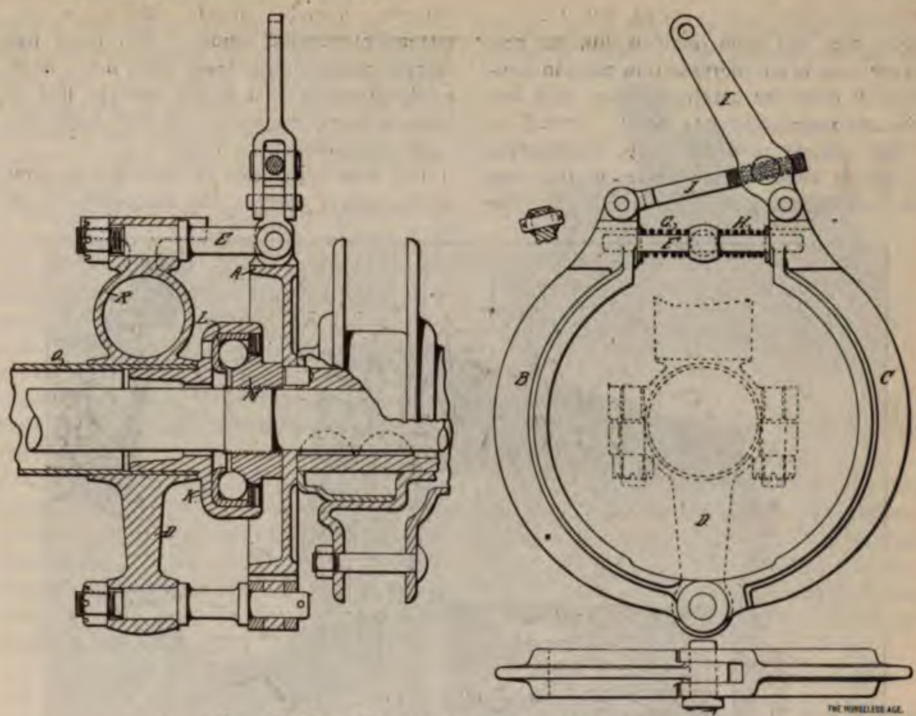


FIG. 6—HUB BRAKE AND REAR AXLE BEARING.

Mooers' Motor Sleigh.

The sleigh of which a photo is shown herewith was built by W. E. Mooers, Goodwins Mills, Me., and we are informed that it is the first motor sleigh built in that part of the country. The weight is about 410 pounds and the motive power is furnished by a 2 horse power, water cooled gasoline engine, the speed of which can be varied from 1,000 to 1,500 revolutions per minute. The engine drives a two speed gear with separate friction clutches, from which the power is transmitted by a five-sixteenths of an inch Baldwin block chain to a spur wheel behind the sleigh, which is held down in the snow by means of a lever worked by the foot. It is claimed that this spur wheel will never slip when the snow is not more than 15 inches deep. The wheel is 16 inches in diameter, and is provided on its circumference with one-half inch steel forks. When the sleigh runs along the road and the runners are not more than a foot from the hard bottom of the road, the spur wheel will go down into the snow till it comes in contact with a hard bottom, which will prevent it from slipping. The front runner is shod with 2 inch flat steel and has besides a half round shoe in the centre to prevent slewing. A speed of about 12 miles per hour can be obtained. Calcium chloride is used in the cooling water and no trouble from freezing is experienced even when the thermometer stands at 15 to 20° below zero.

This photo is of the sleigh built last year. The only trouble that was experienced with it, we are told, was that there was not power enough for all conditions. Mr. Mooers is building another machine this winter with a number of improvements, of which, however, no photograph has yet been taken.

The 1903 Model Rambler.

Thomas B. Jeffery & Co., Kenosha, Wis., have just brought out their model "E" Rambler touring car. Although there are no radical changes in design as compared with last year's model, improvements have been made in many parts. The most important is undoubtedly the substitution of wood artillery wheels for the wire suspension wheels heretofore used. The new wheels are 28 inches in diameter and shod with 3 inch pneumatic tires. Brake drums are fastened upon the hubs of these wheels and direct rear wheel braking is thus secured. The wheels have twelve spokes and large hub flanges, the hubs being made of steel.

The body is not unlike that of last year's model, but the rear has been given an easy slop to make it harmonize with the bonnet lines. A solid back seat, upholstered down to the cushion, has been substituted for the stick seat of last year's model.

The wheel base has been increased from 72 to 78 inches, and the tread is standard. The body is 2 inches nearer the ground and the centre of gravity is thus lowered. The transmission gear remains of the planetary type, but has been enclosed to make it dust and water proof, and the arc of movement of the single operating lever has been considerably reduced. The engine has been increased in size and is now rated at 5½ horse power.

The rear axle sprocket is now made in one piece with the differential gear casing, and thrust bearings are provided on the rear axle to prevent all end play. The rear axle revolves upon four sets of roller bearings; the front wheels upon ball bearings with seven-sixteenths of an inch balls; both axles have been strengthened and the front axle is reinforced for the entire length.

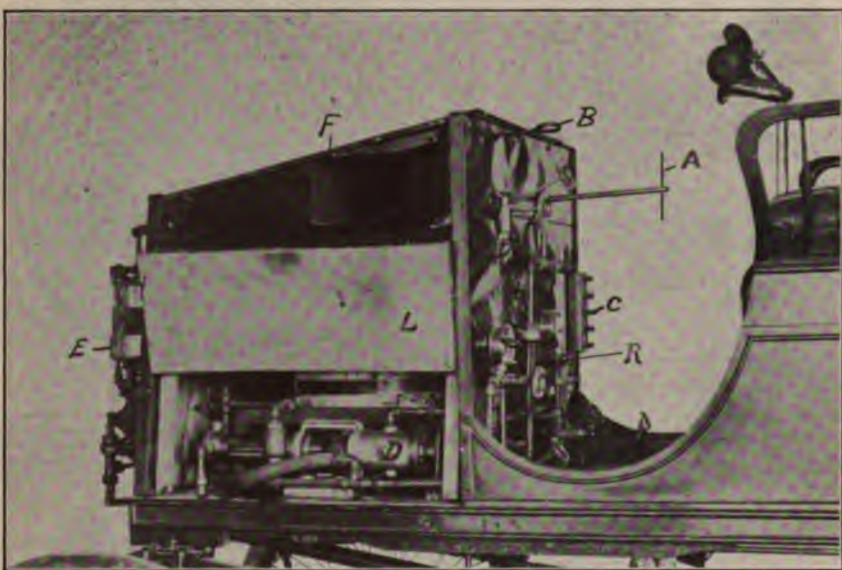
A new float feed carburetor, which has been in experimental use all last summer, is now being fitted. The usual Rambler cool-

MOOERS' GASOLINE MOTOR SLEIGH.

JEFFERY'S 1903 MODEL RAMBLER.

ing system has been retained, but the reservoir has been increased in size in proportion with the engine power, and has now 400 radiating tubes.

The vehicle now has two independent brakes, a brake on the transmission and the hub brakes already referred to. The body is fastened to the steel frame supporting the machinery by three bolts and can be easily removed for repairs. The steering is by a centre lever, hinged, to be operated from either side. The ignition is by jump spark automatically timed; the gasoline capacity is said to be ample for 150 miles, and the speed of the carriage is up to 20 miles per hour on average roads.



Lyon's Arrangement of Machinery and Controlling Devices.

E. H. Lyon's Steam Carriage.

E. H. Lyon, 453 West Twenty-fourth street, New York city, has designed and constructed a steam automobile in which many radical departures are made from the generally accepted models. Mr. Lyon has driven automobiles since the time when every operator of a steam carriage had to be a licensed engineer and still holds his "engineer's ticket."

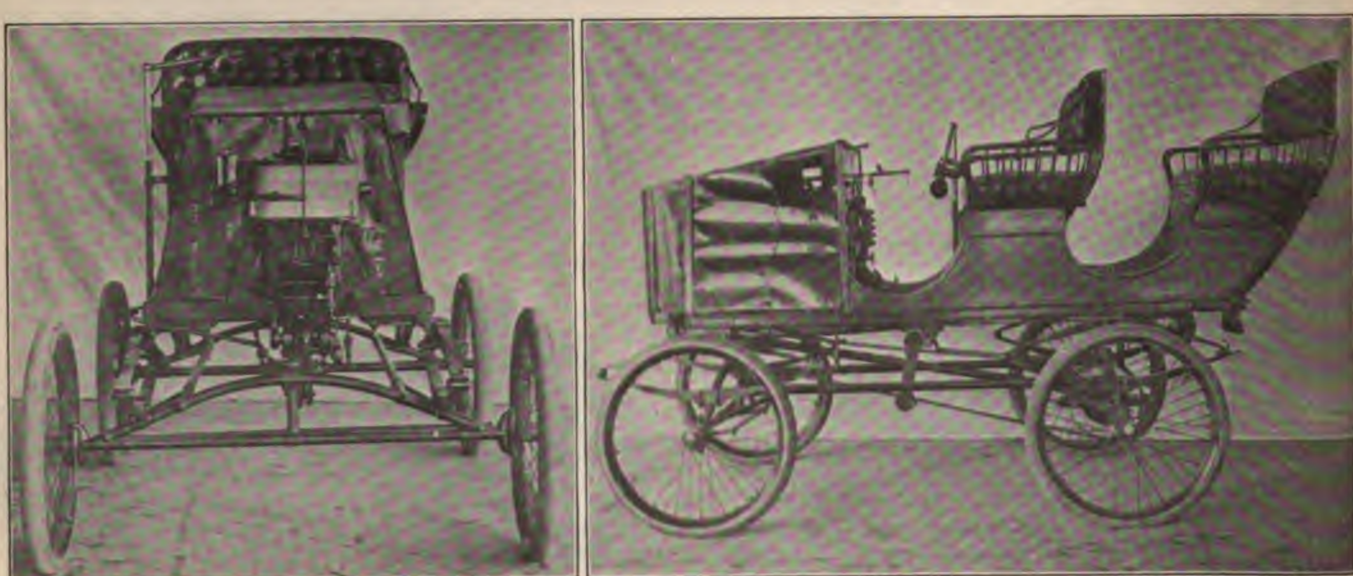
The wide separation of the various parts of the power system, the inaccessibility of the engine and boiler, the exposure of the working parts to dust and other obvious disadvantages of steam carriages he had used led Mr. Lyon to strike out for himself, and with the assistance of his chauffeur, William Conklin, whom Mr. Lyons describes as a "natural genius," he built the machine shown in the accompanying illustrations. Engine, boiler and running gear are all of the type commonly found in steam carriages.

The 14 inch fire tube boiler is placed over the front axle under a bonnet, the rear bulkhead of which forms the dashboard. On this are mounted all the controlling and regulating appliances, which are thus immediately under the eye of the operator and at the same time close to the boiler, the piping being only a few inches in length. A Klinger water gauge C is used, the position of which not only does away with the inconvenient mirror, but also renders its indications more positive than would be the case with long and bent piping. The throttle is a special Crosby valve, which opens fully on a half turn. This valve is so placed that a continuation of its stem passes through the dashboard and terminates in a handle A just in front of the driver. The present somewhat crude arrangement, consisting of a straight rod with a short crosspiece at the end, Mr. Lyon states, will be replaced by a spade handle and a knuckle joint which will allow the rod to drop down out of the way when not in use.

The reversing gear handle B is at the top of the dash in the centre and is also within easy reach. The Locke regulator R is entirely in sight, owing to the fact that the burner is on a level with the floor. The Moore combination water and oil pump D is placed close to the base of the boiler on the left hand side of the bonnet and is accessible through a hinged door L. (See illustration.) The right hand front corner of the bonnet is occupied by the muffler, from which the exhaust is led to the extreme rear of the carriage.

The smoke flues F are just in front of the dash at the top of the hood. For some reason the heat and gases thrown out are carried downward and outward and not into the faces of the passengers, as would seem probable at first sight.

The engine E, to quote Mr. Lyon, is "stuck on" the front of the hood, and is covered and protected by a light sheet metal casing, which is easily removable. Power is transmitted to the rear axle by a long chain running the entire length of the carriage. Sheaves of lignum vitæ are placed midway between the sprockets to prevent slack and whipping. This long



Front and Side Views of E. H. Lyon's Steam Carriage.

chain, which was at first thought to be a disadvantage, has, in the opinion of the designer, proved one of the best features of the carriage. It appears to give enough to cushion the power impulses of the engine, not only preventing the pulsations being felt by the occupants, but also easing the sudden strains on the engine bearings. In proof of this Mr. Lyon states that since his new carriage has been in use he has only had occasion to adjust the bearings two or three times, while in the same time the bearings of an engine in the usual position in another of his steamers have required renewing twice.

The engine may be removed in a very few minutes by disconnecting a few unions and withdrawing a pin, and in case repairs are required a spare engine may be substituted, the whole operation of changing engines not requiring over twenty minutes. In touring a spare engine could be carried for use in case of necessity and a change made at any time or place, a wrench being the only tool required.

The vehicle is a two seated one, the back seat overhanging the rear wheels, and, with the novel disposition of the power, giving a somewhat peculiar appearance to the tout ensemble. The fuel tank (4½ gallons) is hung under the body in the rear, while the water tank (32 gallons) is under the front seat. The space under the back seat is thus left clear for storage or for extra tanks.

No patents have been taken out, the designer's sole object being to construct an automobile which would satisfy his own requirements. Regular stock parts were used throughout and nothing is made specially.

The chief advantages claimed are easier riding and smoother motion; longer life of engine, etc.; extreme accessibility, all parts being on the outside where they can be got at, and absolutely nothing hidden away in the interior; fire unaffected by the highest winds and impossibility of freezing up, even in below zero weather, everything being hot and "alive."

Mr. Lyon intends building another machine which will differ from the present one only in the matter of finish and a few minor details, the general arrangement leaving nothing to be desired. The wheel base will be lengthened, the hood will be reduced in size and handsomely curved, and the general outline of the body improved.

The Centaur Electric Vehicle.

The Centaur Motor Vehicle Company, of Buffalo, N. Y., are placing upon the market an electric vehicle of which they furnish us the following description:

The motors employed have ball bearings, are of ample capacity and will sustain without injury of any kind an overload of 100 per cent. above their normal rating for one hour, and will commutate perfectly up to at least 200 per cent. overload. The design has been carefully worked out with a view of obtaining low current consumption with a reasonable weight. Durability also has been considered one of the first essentials, and these motors have been operated for hundreds of miles in rough service with absolutely no attention, and in general little care is needed other than to properly oil the bearings.

Recognizing the injurious effects of heavy discharges on both the capacity and life of storage batteries, the motors have been designed to give a higher turning moment for a given current than is usual in this type of vehicles. This provides the necessary torque or pull for starting, hill climbing and heavy roads without necessitating a discharge of current harmful to the batteries. The motor winding is arranged in two halves, allowing of a four speed series parallel system of control and reducing paralleling of the batteries to a minimum. The weight of the motor is sustained by the springs, thus protecting it from the jars and shocks of travel over rough roads.

The speed reduction is through the medium of a brass shrouded rawhide pinion meshing with a bronze gear on the ball bearing countershaft, all running in oil in a dust proof case and practically noiseless. Power is transmitted to the rear axle by a roller chain, the pull of which is resisted by adjustable radius rods on either side.

The battery consists of fourteen large capacity "Exide" cells, assembled in two trays and easily accessible. A battery indicating instrument is used in which the complications of the ordinary ammeter are eliminated. A small electric bulb located just above this instrument, lighted by pressing a foot button in the floor of the vehicle, enables the operator to plainly read the instrument when riding at night. The instrument will serve as a check against charging stations, since it enables the operator to determine the extent to which the batteries have been charged.

Electric lamps are fitted on each side, throwing the light ahead and on either side and also showing a red light as a warning signal to any vehicle approaching from the rear. The lights may be turned on or off at will. The steering device is a side lever so designed as to telescope when not in use. The machine is equipped with two positive, double acting brakes which, when idle, do not engage with or rest upon the brake drum, and either of which would be effective in the event of accident to the other. A locking device operated by the foot enables the operator to set the brakes so that the vehicle will remain in position on any grade.

The controller is so designed as to be interlocking at the point between forward and reverse to avoid unintentional and sudden reversals of motor.

The cutout switch can be thrown either by foot or hand in case of a broken controller handle or other similar unforeseen accident. When the battery is being charged all motor and controller circuits are "cut out" so that any interference with the controller, motor or wiring can have no damaging effect. The vehicle cannot be

operated in the absence of the special key necessary to connect the current.

The suspension of the body, motor and battery is such that the maximum weight is supported by the springs, the advantage of which with respect to light running qualities, general saving of tires, economy in mechanical upkeep, etc., is at once apparent.

"American" Ignition Apparatus.

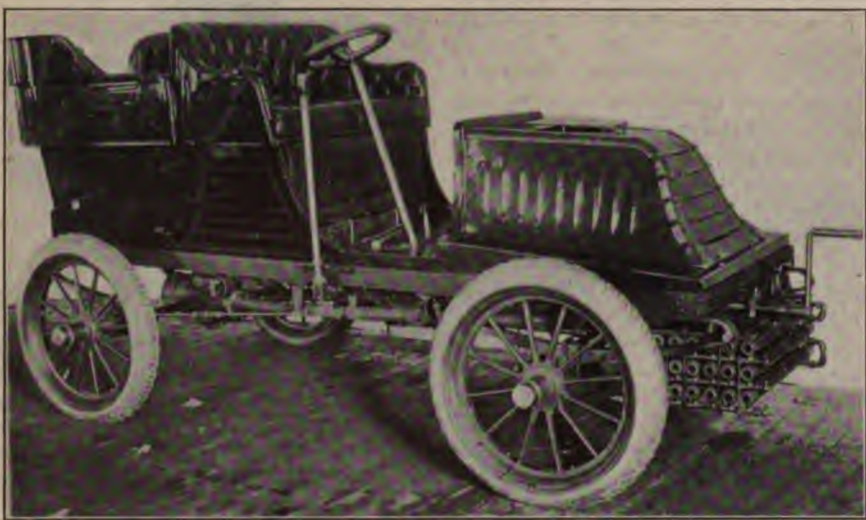
The American Coil Company, of West Somerville, Mass., have brought out for the 1903 season a number of new ignition devices, including an "automatic" spark coil, a dynamo and a pocket ammeter. The automatic coil is said to be so constructed that it will act like a vibrator coil when the engine is started or is running at a very slow speed and as a plain coil without any vibrator when the engine runs at normal speed. The advantage claimed as compared with an ordinary vibrator coil is that at full speed the circuit need not be closed as long and a saving in current is therefore effected. Compared with the ordinary plain coil the advantage of a shower of sparks in starting is secured, which makes starting more certain.

The dynamo is built with a storage battery in the base, which is kept constantly charged by the dynamo and admits of starting the engine without any extra batteries. The dimensions of the base of the

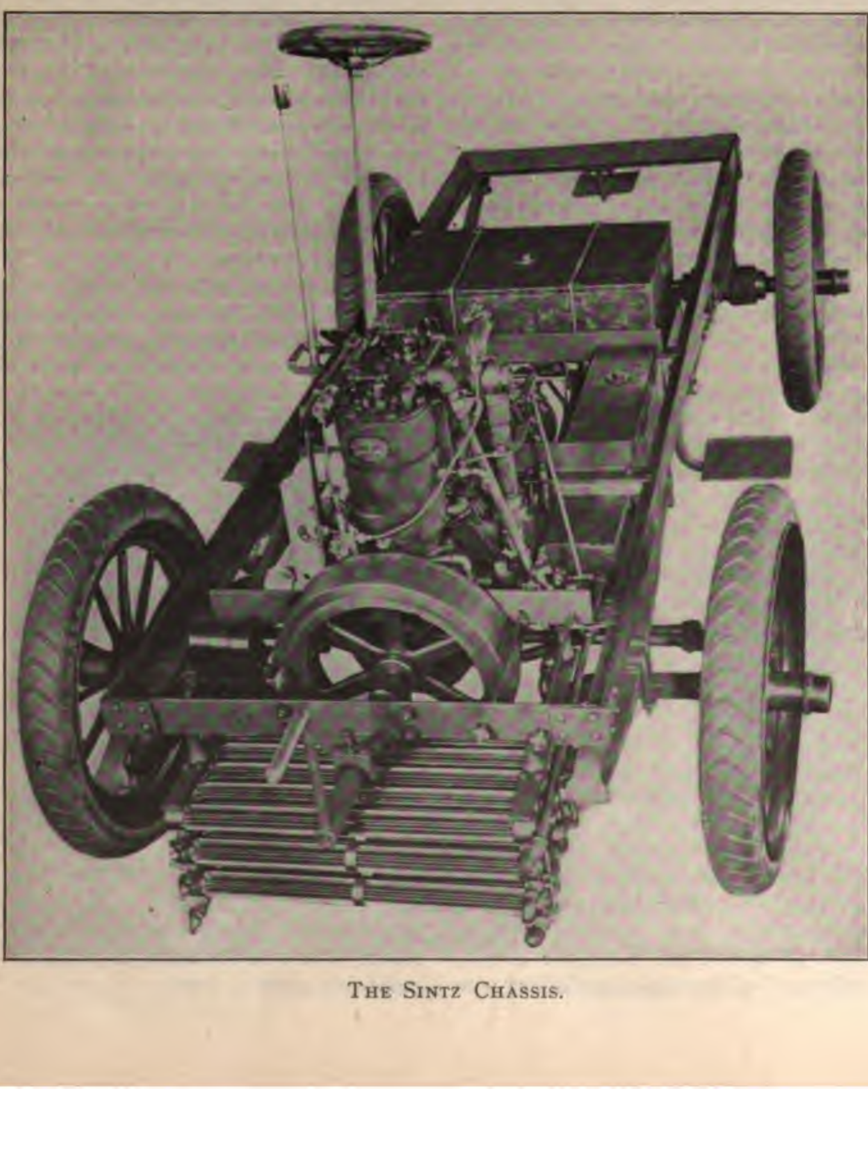
dynamo are 1½x4x6 inches. The dynamo with battery is said to weigh only 14 pounds. The dynamo bearings are ring oiling. The machine has four brushes; no governing pulley is used.

The Sintz Gasoline Tonneau.

We give herewith two illustrations of the car built by Clark Sintz, of Grand Rapids, Mich., to which we referred recently. In one of the photos the car is shown complete with body but without mud guards, and the other photo is of the chassis. This car is equipped with a double cylinder, 16 horse power gasoline motor and has a three speed forward and reverse transmission. The engine and transmission are carried on two angle steel supports and are connected to each other by springs which absorb all shock in starting the car. The transmission gears are contained in an oil tight casing 7½ inches long and of 9½ inches diameter. There is but one friction clutch and the change gear and clutch are both operated by the lever shown at the right side of the car. Moving this lever forward and back changes the gear, and moving it outward engages the friction clutch. The gear can be changed from high speed forward to reverse without engaging the intermediate or low speed.



Sintz Gasoline Tonneau.



The Sintz Chassis.

The carburetor is of the constant level type, but has no float. Ignition is by either touch or jump spark and is controlled by a lever shown on top of the steering post. The throttle lever or pedal is shown at the right side of steering post and is operated by the right foot. The lubrication is by a sight feed on the dash.

By raising the hood all parts of the engine can be gotten at, and by raising the floor boards the transmission, clutch and water pump are gotten at. There is said to be no need to get under the car for any repair work. The water is circulated by a rotary pump, which is direct connected to the transmission shaft.

The length over all of the car is 10 feet 6 inches. The wheel base is 7 feet and the tread (outside) 4 feet 8 inches. The wheels are 36 inch, of wood, artillery type, and the tires 4 inch, either single tube or clincher, as desired. The gasoline tank holds 15 gallons and the water tank 10 gallons.

The engine is claimed to develop its full rated power at 450 revolutions per minute and to run up to 1,000 revolutions per minute.

The Knox 1903 Model.

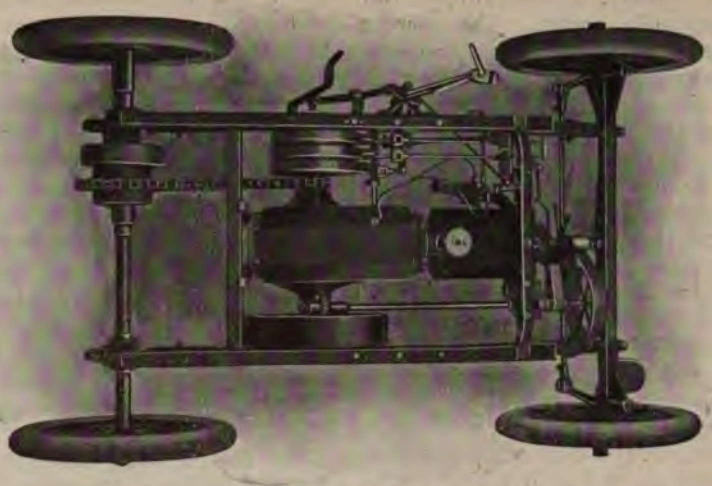
The Knox Automobile Company, Springfield, Mass., are now delivering to their agents samples of their 1903 waterless Knox car. The general design is similar to the 1902 model, but many improvements have been made. The company furnish the following details of these improvements:

The number of cooling pins in the cylinder has been increased; also the size and speed of the fan. The engine stroke has been increased 1 inch, making it the largest and most powerful successful air cooled engine in the world. The folding front seat of the body has been made wider, deeper and much more comfortable in every way and will easily seat two grown people. Brass arm rails have been added to the sides. The finish and trimming of the body has been improved and an option of two colors of paint will be given—dark red with black trimmings and gold stripe, or dark Brewster green with black trimmings and gold stripe. The wheel base has been lengthened to 6 feet. Wood wheels and 30x3½ inch double tube tires are now used. Extra large improved roller bearings have replaced the ball bearings on the running gear and all the plain bearings on the engine and transmission have been made much larger and bushed with the best anti-friction metal. All bright metal parts, including the lamps, are finished in polished brass instead of being nickel plated. The emergency hand brake has been increased in size and is much more effective.

The oiling system has been simplified and made more convenient. A chain with a guaranteed breaking strength of 10,000

pounds is now used and it may be easily adjusted by turning a nut on the rear end of the springs. A triple expansion muffler is used, giving a quiet exhaust with no back pressure. The high speed clutch has been greatly improved and is now located inside the transmission casing, protected from all dust and mud. It may be quickly and easily adjusted from the side of the car and gives any degree of friction with slight pressure on the clutch lever.

The starting of the engine has been made easier and more positive by an improvement in the priming device. Both the front and rear axles and all other parts of the car subject to strains have been made stronger and more durable and the weight is now 1,600 pounds complete. Some further details will be given in our Show report next week.



Plan of the Knox Running Gear.

Two Cycle Engines.

The Elmore Manufacturing Company write us to the effect that they consider certain comparisons which have been made in our columns between the two cycle and four cycle engine as damaging to their interest, and that the statements made are not in accordance with their views. In response to the request of one of our correspondents they have had an article prepared on "Two Cycle Engines for Automobiles," by their engineer, E. W. Roberts, which we are asked to reproduce in our columns. This article is appended here.

TWO CYCLE ENGINES FOR AUTOMOBILES. BY E. W. ROBERTS.

Owing to the simplicity of its mechanism as compared with a four cycle engine the two cycle gasoline engine has proven itself a great favorite for the motor boat, and since its first introduction in the early 90's its use has steadily increased, until now about 90 per cent. of the motor boats are using two cycle engines. Not only in the simplicity of its mechanism, but in the greater frequency of impulses at equal speeds a two cycle engine has a marked advantage over its prototype. Why it has not been adopted more generally for the automobile is a question that has been answered by a great many people in a great many different ways, and with the majority of these people the answers indicate nothing more than absolute ignorance of the subject. For instance, the author of a considerable volume on automobiles makes the statement that, "While a four cycle engine of a given horse power will run at as high a speed as 1,200 or 1,500 revolutions per minute, a two cycle engine of the same power can make no more than 300 or 350 revolutions per minute." Where this writer secured the foundation for such a statement I can make not even a guess, for I have handled both types of engines and found that the two cycle was just as capable of high speeds as the four cycle. Personally I do not believe there is the slightest difference in this regard, as speed without loss of torque is in either type merely a question of port openings and igniter lead, but principally the former. I have tested a 20 horse power, two cylinder, two cycle engine, 8½-inch bore by 6 inch stroke, which ran continuously for hours at a time at a speed of over 400 revolutions per minute. I have tested a two cylinder, two cycle automobile engine, which developed 4 horse power at 400 revolutions per minute and 10 horse power at 1,000 revolutions per minute, and this same engine has run continuously without a break at 1,650 revolutions per minute. The most interesting part of this performance is that this speed was developed while the engine was running an automobile.

There is a peculiar superstition about a two cycle engine "choking itself," whatever that means, when it gets to a certain speed. I presume it refers to the tendency of all gas engines to fall off in torque as they pass the speed for which their port openings were designed. A four cycle engine will act in precisely the same way as a two cycle under like conditions, and I have seen a four cycle engine of 4½ inch bore by 5 inch stroke that would scarcely run 300 revolutions per minute under its own load. The cause of this peculiar performance was not far to seek and was due principally to an exceedingly small inlet valve. Yet the builder of this engine thought "she was a dandy."

There are a lot of other funny things that enter into the imagination of those familiar with four cycle engines only or whose knowledge of two cycle engines is limited to some of the earlier designs, or perhaps to the attempts of an amateur. It takes skill and experience to build two cycle engines just the same as in any other class of machinery, and when the two cycle engine is to be used on an automobile it requires greater care in manufacture and fuller attention to the small details than when the engine is intended for any other purpose.

One firm building two cycle automobiles has put out about 150 of this style of machine and have, so far, to hear of a single complaint in regard to the adaptability of this type of motor to vehicle use. In fact, when comparisons were made, based upon the results obtained in actual service, the two cycle engine has shown itself, if anything, superior to the more complicated type.

For the automobile, and especially for that class which sees daily service, simplicity of the mechanism is fully as important as anything else. A two cylinder, two cycle engine has fewer parts by a considerable margin than a single cylinder, four cycle engine. A two cylinder, two cycle engine has as many impulses in a revolution as a four cylinder, four cycle, and therefore is fully equal to the latter in steadiness of running. A two cycle engine will develop at least 60 per cent. more power than a four cycle engine of the same size. The greater frequency of impulses gives equal steadiness of running with less flywheel capacity. These last two features show plainly that it is possible to build a two cycle engine lighter than a four cycle engine of the same power, particularly when the four cycle engine is made with an enclosed crank case, as automobile engines most generally are.

As to flexibility under control, a two cycle engine is not only equal to a four cycle engine, but is in some ways its superior. With constant igniter lead the two cycle engine will pass from its lowest to its highest speed as quickly, if not more rapidly, than a four cycle engine. This is due principally to the greater frequency of the impulses, for anyone knows that a multiple cylinder engine will speed up quicker than a single cylinder engine. Any automobilist who has driven his machine on a crowded city street will recognize the advantage of a machine with which he can dart quickly through an opening in the traffic which surrounds him. It is certainly easier on the machine to do this by engine control rather than by the throwing in and out of clutches.

Owing to the fewer number of parts the two cycle engine has a distinct advantage over the four cycle in the matter of repairs.

Take, for instance, a two cylinder, two cycle automobile engine. The moving parts consist of one crank shaft, two connecting rods and two igniter electrodes. The only springs on the entire engine are the two springs on the igniters. The engine does not contain a gear, a cam or a valve. The only bearings that ever need adjusting are those on the connecting rod, and the necessity for this adjustment does not frequently occur. The igniter is self contained and may be replaced by an entirely new one in less than ten minutes. The crank shaft bearings never require adjustment, and all that needs to be taken care of on the engine proper is the connecting rod and the igniter. It would seem that this engine would be an excellent one for a long tour, and so it has proven in practice. For instance, a two cycle machine was driven over 1,000 miles last summer without any further trouble with the engine than a loose igniter wire, and the operator's entire expense for repairs was but 20 cents. Of course, it must be admitted that this low repair bill was unusual, yet I do not believe that there is an owner of a two cycle automobile who would be willing to trade for a four cycle machine.

[After reading Mr. Roberts' article it appears to us that he has sought to evade certain important points upon which our correspondent particularly desired enlightenment. He tells us that most of the reasons given why the two cycle engine has not been more generally adopted by automobile manufacturers are based on ignorance, but he fails to state what he considers to be the correct reason.

It is, of course, generally known that a two cycle engine is much simpler in construction than a four cycle, and we also see no reason why a two cycle engine should not be equally flexible. These are the reasons why the two cycle engine is so generally used for small launches, in addition to the fact that a small launch engine driving the propeller directly must necessarily run at 300 to 400 revolutions per minute, so that any engine, the most advantageous speed of which is far above this, would be at a disadvantage. We would ask Mr. Roberts whether it is not a fact that whenever a launch is built specially for speed a four cycle engine is generally used, and whether the speed record for gasoline launches is not held by a launch equipped with a four cycle motor; and if so, and a two cycle is capable of developing 60 per cent. more power than a four cycle, as he maintains, we would like to know the reason for this apparent anomaly.

We are of the opinion that the relative power for given cylinder dimensions is a factor that has little influence on the ultimate value of a type of engine for automobile work as long as enough power can be provided to meet all requirements; and this, we know, can be done with either two cycle or four cycle engines.

The performance of the Elmore vehicles in the recent Endurance Contest has proven conclusively that two cycle engines are practicable for automobiles. Whether they are better or not than four cycle engines will not be decided by a discussion, but must be left for determination on the road by the users.—ED.]

The New Haynes-Apperson Factory.

The Haynes-Apperson Company, of Kokomo, Ind., have just completed their new factory building and have now one of the best equipped plants for the manufacture of automobiles in the country. The factory comprises three main buildings extending from one street to another and two stories high, covering about 80,000 square feet of floor space. The lower floors of the first and third buildings are the machine shops, which have a solid cement floor and plenty of light and heat. The ground floor of the central building forms the assembling department. The upper floor of the first building forms the woodworking shop, where the bodies are built. The second floor of the central building contains the painting department. Besides these three main buildings the plant includes a foundry, blacksmith shops and a tin shop immediately adjoining and an office building fronting the street. This office building is provided with a reception room for visitors.

Dixon's Motor Chain Compound.

The Joseph Dixon Crucible Company have recently brought out a new chain lubricant which, contrary to ordinary chain lubricants which are adapted only to exterior lubrication, lends itself to a treatment that will reach the innermost wearing surface of the pivots.

This compound is composed of a mixture of Dixon's 635 special lubricating graphite with mineral and animal lubricating materials and is made into hard oblong cakes weighing about 3 pounds. The method of treating the chain with this compound is as follows:

The chain is first thoroughly cleaned by repeated immersion in naphtha or benzine. When dry it is placed in a flat pan large enough to receive the chain when coiled up somewhat loosely when enough of the chain compound is melted in the pan to cover the chain completely. The temperature of the melted compound should be at least 180°, to insure sufficient fluidity, so that it will reach the interior wearing surfaces of the chain, and the chain should be moved about as much as possible. Removing the chain, allowing it to cool and again immersing in the compound, will aid materially in bringing about this result. When finally removed, the surplus compound is wiped off and the chain allowed to become cold. The chain must not be used before it is perfectly cold, as that would result in the compound being forced out of the joints.

MINOR MENTION

Ashtabula, Ohio, automobile owners will form a club this year.

Decorated automobiles will be made the leading feature of the annual floral parade at Pasadena, Cal.

Cleveland, Ohio, according to reports, will have a new gasoline automobile manufacturing company.

A motor fire engine owned by the International Fire Engine Company was tested at Newark, N. J., on January 5.

Four automobiles a day, it is stated, will be the capacity of the Winton Motor Carriage Company, Cleveland, Ohio, this year.

The New York agency of the Knox Automobile Company, Springfield, Mass., will be located at 146 West Thirty-ninth street on and after February 1.

The Manhattan Transit Company, an auto cab operating concern, has bought for $700,000 the entire block at Fulton and Furman streets, Brooklyn, N. Y.

The Winton Motor Vehicle Company, Cleveland, Ohio, has taken a lease of a building which is being erected at Berkeley and Stanhope streets, Boston. It will be 56x48 feet and one story high.

Plans have been completed for two additional buildings for the H. H. Franklin Company, Syracuse, N. Y., one 40x60 feet, for charging motors with gasoline, and the other of three stories for an office.

The entire building at 134 to 138 West Thirty-ninth street has been leased by the Electric Vehicle Company, Hartford, Conn., for its New York headquarters. It is 75x100 feet and contains space for the display of over 100 vehicles. The opening will take place at about the time the Automobile Show opens at Madison Square Garden.

The Michigan Automobile Company, Limited, has just been organized at Kalamazoo, Mich., to manufacture automobiles. The board of directors consists of Dallas Boudeman, W. E. Upjohn, Frank D. Fuller, Charles D. Fuller and M. E. Blood, and the active officers are: Frank D. Fuller, secretary and general manager; M. E. Blood, treasurer and general superintendent, and C. D. Fuller, chairman. The above and the following named gentlemen comprise the incorporators: C. A. Dewing, J. H. Dewing, P. L. Abbey, C. C. Blood, Ira Ransom, Dr. A. H. Rockwell, G. Vande Kreeke, J. D. Schell, E. H. Hinkley and H. H. Everard. The automobile to be manufactured is called the "Blood," and is the invention of M. E. and C. C. Blood, of the Kalamazoo Cycle Company. The new company will begin manufacturing at once and expect to turn out from one to five machines a day by

April. A factory and 4 acres of land have been purchased in Kalamazoo.

Owners of automobiles in St. Paul and Minneapolis are arranging to form a club.

John C. Blevney, of Newark, N. J., has completed a 3 ton steam truck with steel tires.

The Motor Car Company, Newark, has secured the New Jersey agency for the "Autocar" and "Northern" automobiles.

The Automobile Club of Syracuse held its first annual smoker last week, which is reported to have been very successful.

The Fiat machines are made in sizes of 16, 20 and 30 horse power and not 10, 16 and 30 horse power, as erroneously stated last week.

George W. Blackmore, Painesville, Ohio, is fitting up a two story brick building on Maiden lane for use as an automobile station.

The Springfield, Mass., Automobile Club has chartered two special cars to take the members to the New York show on Tuesday, January 20.

Councilman D. C. Fields, Dunkirk, N. Y., drew an automobile valued at $700 at a raffle under the auspices of the Maccabees on January 2.

It is reported that the Long Island (N. Y.) Railroad Company is having a number of automobile trucks built for use by the express service.

Symphony Hall is reported to have been decided upon by the automobile dealers of Boston as the place for holding an automobile show next March.

The Valley Auto Company has been organized to deal in automobiles and conduct repair shops in Bay City and Saginaw, Mich. F. H. Fenner is manager.

The Motor Cycle Company, Bristol, Conn., has increased its capital stock to $40,000 and will manufacture motor vehicles. It purposes erecting a factory.

The plans for transforming the Grunewald Forest, near Berlin, into a park provide for the construction of an automobile speedway 21 yards wide and 7½ miles long.

The Neftel Automobile Company, New York, has been incorporated; capital, $75,000; directors, William Hoey, Frank Queeney and Knight Neftel, all of New York.

Adolf A. Geisel takes issue with the claims of the Brockton Automobile Club that it is the second largest in Massachusetts, and writes that the Springfield Club has fifty-one members.

The Electric Transit Company has been incorporated to operate motor vehicles in New York city; capital, $5,000; directors, John Mills, Thomas Steeley and Frank E. Taylor, all of New York.

Two automobiles of the Haynes-Apperson Company intended for the New York show were burned up and three others damaged in a railroad car in Kokomo on January 7, owing to a gasoline explosion. A lighted candle had been held too near the tank of one of the machines. The loss will be about $3,000. Other machines from the same factory will be shipped in their place.

The Automotor Company, of Springfield, Mass., has been incorporated under New York State laws. The directors are Hinsdale Smith, Arthur P. Smith and H. M. Billings, all of Springfield.

It is reported that the Olds Motor Works are contemplating the establishment of a distributing depot at Binghamton, under the management of R. W. Whipple, to cover ten counties in New York State.

Service by automobiles on the Eads Bridge at St. Louis has been discontinued by the Interstate Transit Company until (it is said) more commodious and a larger number of machines can be added.

The Premier Motor Manufacturing Company, Indianapolis, Ind., with a capital of $50,000, has been incorporated. Harold O. Smith, John E. Smith, George A Weidely, Charles Bierhaus and Clarence M. Zener are the directors.

The Centaur Motor Vehicle Company, of Buffalo, have appointed the following agencies: Chicago, Pardee & Co.; Pittsburg, Pittsburg Automobile Company; Rochester, F. A. Mabbett Company. The company reports having received several orders from Europe.

The Streator Automobile and Manufacturing Company, Streator, Ill., has been incorporated by Bartlett H. Campbell, John B. Lott and Charles F. Lott, to make automobiles and tubular steel wheels; capital, $25,000.

The second annual reception and smoker of the Massachusetts Automobile Club was held at the clubhouse on Boylston street, Boston, on January 2. Capt. W. J. H. Nourse, late of the English Army, delivered an address on the Soudan campaign.

About thirty auto owners of Lowell, Mass., met on January 1 to form an organization. W. S. Southworth was elected president, S. C. Mussey secretary, and W. H. Green treasurer. A committee was appointed to work up interest with the other auto owners of the city.

Binney & Burnham, Boston, have dissolved and a new partnership has been formed under the name of Lyman & Burnham to manufacture gasoline and steam cars. Two models of tonneau touring cars will be placed on sale by the firm early in the spring.

Fire caused by an overheated oil tank partly wrecked the plant of the Federal Manufacturing Company at Ninety-second street and Anthony avenue, South Chicago, last week. The main building was leveled to the ground, while part of the shipping structure to the east was destroyed. The loss is estimated at $150,000.

The annual meeting of the stockholders of the Geneva Automobile and Manufacturing Company on January 6 resulted in the election of the following directors: Fayette Brown, Frank A. Arter, Gen. James Barnett, T. A. McCaslin, Dexter B. Chambers, Cleveland; Henry Means, J. A. Carter, Geneva. At a meeting of the stockholders on December 30, the capital stock of the company was increased by $50,000.

New Orleans automobilists have called a meeting to organize a club. There are about thirty cars in the city.

The Colorado Automobile Company, Denver, capital $50,000, has been incorporated. Louis Lindahl, formerly manager of the Winton Motor Carriage Company, is secretary and general manager. The company is the Colorado representative of the Winton, Baker and Woods machines.

The Vereinigte Benzinfabriken, of Bremen, Germany, have established a system of gasoline supply stations in Germany, with a head office at 40 Kurfurstendamm, Berlin, under the management of Anton Niermann. Foreign automobilists visiting Germany may obtain a list of the stations free of charge from January 1 on.

Achille Philion, a spiral tower performer, of Akron, Ohio, built a steam automobile in 1889, of which we have received an illustration. A vertical tubular boiler of the conventional stationary form and a vertical engine are mounted upon the frame of the carriage. One seat is arranged in front, evidently for the steersman, and one in the rear for the engineer.

Negotiations have been completed by Smith & Mabley, New York, with M. A. C. Neubauer, American representative of the Panhard & Levassor Company, of France, whereby they secured the exclusive agency in this country for the Panhard automobile. The parts will be imported and assembled in a factory, a site for which near New York is being looked for, together with the bodies, which will be built by J. M. Quinby & Co., Newark, N. J. The output will bear the name plate of the Panhard & Levassor Company.

Pasadena, Cal., automobilists have organized a club along the lines of the A. C. A. The charter members include T. S. Safe, H. Earl, C. B. Scoville, J. B. Miller, H. J. Macomber, A. K. Macomber, J. T. Pugh, Tracy Drake, H. H. Sherk, H. T. Kendall, L. Perrin, R. H. Gaylord, B. O. Bruce, Lloyd Macy, J. B. Lovell, Ellicott Evans and L. J. Merritt. Mr. Evans, president of the Buffalo Automobile Club, who is stopping at La Solana, was elected president; King Macomber, vice president; Mr. Scoville, second vice president and treasurer; Mr. Pugh, secretary, and Messrs. Pugh, Drake, Kendall, H. J. Macomber, Gaylord and Miller, together with the officers, as a board of governors.

W. A. Starley & Co., of Coventry, England, write us, stating that in the recent article on the "Motor Cycle Trade in Great Britain" their product was overlooked. They build a bicycle with a motor of exceptionally few parts, as the flywheel, axles and connecting rod pins are in one piece. The cycle frame has been specially constructed, and it is the only machine in England (they believe) at the present time suitable for fitting an ordinary chain case.

Every part of the machine is home made, excepting the accumulator and coil.

The regular monthly meeting of the Bridgeport (Conn.) Automobile Club has been postponed to February 2, when the new clubrooms will be used.

C. E. Shaw, Detroit, until recently connected with the London branch of the Olds Motor Works, is reported to have taken the management of the English Motor Company, which will make a specialty of American parts and sundries.

The Pan-American Motor Company has increased the number of its directors to nine and its capital stock to $500,000. William E. Power, its designing and consulting engineer, recently returned from the Automobile Exhibition at Paris, where he made purchases of attachments and parts.

The Moyea Automobile Company, with $100,000 capital, and Henry C. Cryder, late receiver of the Automobile Company of America, as its president and general manager, has been formed to build machines favoring the Rochet-Schneider pattern. A factory site is being sought at Middletown, Conn., or Atterbury, Mass.

New York Automobile Show.

Recent advices place the number of exhibitors at the Automobile Show at Madison Square Garden, New York, at about 147, which is an increase of 100 per cent. over those who exhibited in 1900. Of these, fifty-six will exhibit finished automobiles. Gasoline cars will be in the majority, but an excellent showing of steam and electricity will be made. Manufacturers of accessories and parts will also be well represented. Among the foreign cars to be shown will be the Panhard, C. G. & V., Renault, De Dion, Peugeot, Mors, Decauville, Cotterean, Rochet-Schneider, Georges Richard and Clement, and among the machines of American manufacture will be the Peerless, Winton, Locomobile, White, Columbia, Haynes-Apperson, Packard, Pierce, Toledo, Berg, Fournier-Searchmont and Autocar. It is reported that a considerable delegation of French tradesmen will be present.

Since the publication of the list of exhibitors there has been a number of changes, the following being the new exhibitors: Fisk Rubber Company, Chicopee Falls, Mass.; Brown-Lipe Gear Company, Syracuse, N. Y.; the Midgley Manufacturing Company, Columbus, Ohio; Timken Roller Bearing Company, Canton, Ohio; Fickling & Fulton, 248 West Fifty-fourth street, New York city; Stearns Steam Carriage Company, Syracuse, N. Y.; Union Motor Truck Company, 106 Tasker street, Philadelphia, Pa.; American Coil Company, West Somerville, Mass.; Standard Automobile Company, 136 West Thirty-eighth street, New York city; the Motor and Gear Manufacturing Company, 150 Nassau street, New York city; Hyatt Roller Bearing Company, Harrison, N. J.; Whitlock Coil Pipe Company, 85 Liberty street, New York city; Shelby Steel Tube Company, Pittsburg, Pa.; Manufacturing and Selling Company of America, 129 Crosby street, New York city; Electric Contract Company, 53 Maiden lane, New York city; Desberon Motor Car Company, Fifty-first street and Twelfth avenue, New York city; Goodson Electric Ignition Company, 110 Nassau street, New York city; Edison Storage Battery Company, Orange, N. J., and New Jersey Asbestos Company, 52 Dey street, New York city.

Arrangements have been made for the establishment of a bureau of information, which will be open three days before the opening of the show. At this bureau tradesmen will be required to register before being admitted. Admission, by the way, will be free to the trade up to 1 o'clock each day.

The A. A. A., N. A. A. M. and A. M. L. will hold their annual meeting and election of officers during the show.

Manager Sanger, of the show, has given notice that the rule regarding gasoline will be strictly enforced. Most of the makers have arranged to accommodate intending purchasers with exhibitions, by having demonstrations outside the building. Interested parties can secure rides by applying at the maker's exhibit.

Trade Literature Received.

Hartford and Dunlop Tires.—The Hartford Rubber Works Co., of Hartford, Conn.

Williams Spark Coils.—E. Q. Williams, of Syracuse, N. Y.

The 1903 Autocar.—The Autocar Company, of Ardmore, Pa.

Automobile Parts.—The Neustadt-Perry Company, 826 South Eighteenth street, St. Louis, Mo.

Drop Forgings, Machinists' Tools, Drop Hammers, etc.—Billings & Spencer Company, of Hartford, Conn.

The Whitney Automobile—The Whitney Automobile Company, Whitney Point, N. Y.

Motor Cars.—The Tokyo Motor Company, Tokyo, Japan (Bruhl Frères, New York, 54 Maiden lane).

Prescott Steam Automobiles.—Prescott Automobile Company, 83 Chambers street, New York city.

Century Tourist.—The Century Motor Vehicle Company, of Syracuse, N. Y.

"American" Roller Bearings.—American Roller Bearing Company, of Boston, Mass.

Salisbury's Lamps.—Salisbury & Son, Ltd., Green street, Blackfriars, London, S. E.

Both the Anglo-American Oil Company and Messrs. Carless, Capel & Leonard, in order not to be prevented supplying petrol to their customers by the recent arbitrary action of the railway companies, who, although they have made some slight concessions, have refused to withdraw clause 2 in the consignment note, have decided to sign the consignment notes under protest reserving to themselves the right of taking further action.

LEGISLATIVE AND LEGAL.

The hearing on the automobile speed ordinance in Peoria, Ill., has been postponed till January 15.

Frank Schemerhorn was fined $3 and costs in Detroit on January 6 for fast automobile driving.

Representative A. E. L. Garner has prepared a bill regulating the operation of automobiles, which he will introduce in the Missouri Legislature.

An amended complaint has been filed in Middletown, Conn., in the case of Harry Metzger vs. the Eisenhuth Motor Vehicle Company in place of the former complaint.

In the Court of Special Sessions, New York, Frederick Alexander on January 7 paid a fine of $50 imposed in a police court for exceeding the speed limit with his automobile.

William Weeks, a New York dealer, was arraigned in the Morrisania Court recently charged with driving an automobile faster than 8 miles an hour. He admitted the charge and was held in $200 bail.

Geo. E. Reed was fined $25 in the Superior Criminal Court of Boston on January 2 for having, on November 18 last, driven an automobile on Huntington avenue at a higher speed than 10 miles an hour.

William Winters, Columbus, Ohio, has brought suit against Lincoln Kilbourne for $2,000 damages, claimed to have been caused by defendant's automobile striking and throwing complainant out of his automobile.

In Toledo, Ohio, Judge Wachenheimer on January 7 found Louis Lichtie guilty of violating the automobile speed ordinance and continued the case for sentence. The case will be carried to the Court of Common Pleas on error.

Attorney for Harry S. Woodworth, Rochester, N. Y., whose conviction and fine of $50 for violation of the automobile speed law has been affirmed by the Appellate Division of the Supreme Court, will endeavor to get the case before the Court of Appeals.

The judiciary committee of the Chicago City Council has appointed a sub-committee to make trials with regard to the most appropriate height of identification numbers for automobiles. Alderman Honore Palmer, an automobilist, has arranged to take his associates for a pleasure jaunt some day during the week. He will have samples of numbers with him.

Among the objects of the Pasadena (Cal.) Automobile Club are the discouragement and if possible elimination of reckless speeding, to induce the City Council to moderate the speed laws, which at present declare that autos shall not travel faster than 8 miles an hour inside the city

and 4 miles an hour across street
gs. The club would like to have the
imits increased to 12 and 8 miles re-
ely, and will invite the councilmen
riding with them in order to demon-
that present limits are too slow.

y Phelps was held in $500 bail in the
iana Police Court, New York, on
y 7, upon the charge of having op-
his automobile faster than the legal

Henning, chauffeur for J. J. Hickey,
nt of the Mount Vernon (N. Y.)
obile Manufacturing Company, was
d on December 23 for violating the
laws.

charge of manslaughter which has
pending against Harry W. Dupuy,
eny, Pa., for causing the death of D.
Munroe, at New Haven, Conn., last
r, has been withdrawn. Mr. Dupuy
id to the heirs of Mr. Munroe $5,000,
l statutory limit.

idelphia's new automobile ordinance
en signed by the mayor. It limits the
o 8 miles, except in certain sections,
it is 7 miles, and imposes a penalty
olation of $50 for the first and $75
second offense. Automobilists and
generally are said to be satisfied
he law.

affairs of Webb Jay, former man-
of the Colorado Winton Carriage
Company, Denver, are now in an
ey's hands, and Charles Bilz, a part-
ith Jay, and now manager of the
do Winton Company, states that
ly no further proceedings will be
It is said that Jay is in Mexico, in-
ing an automobile.

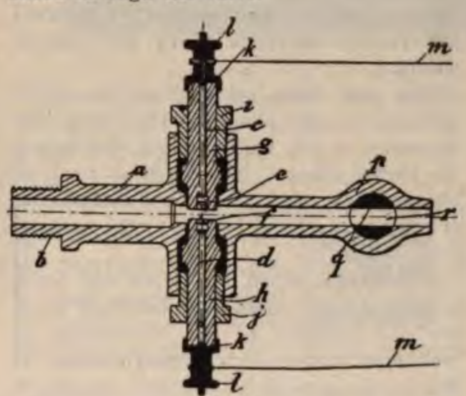
permits issued by the Board of Park
issioners of Louisville, Ky., entitle
olders to operate their automobiles
the parkways and park roads upon
ion and under restrictions set forth
following rules:
he operator of any automobile must
t this permit card upon demand of
rk guard or official.
he number corresponding with the
r of this permit must always appear
the rear of the vehicle while on any
ay or in any park.
he speed of automobiles is limited
miles per hour, but upon curves the
shall not exceed 5 miles per hour.
When horses show fright the operator
automobile must bring his vehicle
ll stop until the horse passes.
ells and gongs must not be sounded
at street or road crossings or on
curves.
numbers used on the rear of vehicles
rnished by the park board.
and three-quarter inch white let-
re used, painted on black patent
r background 5x4 inches, which is
n rear of vehicle with leather ties.

...OUR... FOREIGN EXCHANGES

The Simpson Spark Plug.

The plug herewith illustrated possesses the features of both terminals being insulated and of the possibility of cleaning the terminals by simply opening a valve.

The device consists of a tubular casting *a*, the threaded part *b* of which screws into the cylinder wall. This casting contains two spark plugs *g* and *h*, with porcelain insulating cores, arranged oppositely and in line with each other. The two spark terminals are formed by the metal rods passing through the porcelain cores, which come within a short distance of each other. The spark gap is thus formed at the centre of the opening in the tubular casting, and by opening the valve and turning the engine by hand the operation of the igniter may be observed. The spark points may also be cleaned by means of a special tool introduced through the valve.



SIMPSON SPARK PLUG.

Neither of the electric connections is grounded, and in the case of a two cylinder motor in which the explosions succeed each other at regular intervals the two spark plugs may be connected in series, which result in an appreciable simplification. A spark is then produced in each cylinder during each revolution, the sparks in the two cylinders being identical in size. A single spark coil suffices for the two cylinders.—*La Locomotion Automobile.*

The Paris show is said to have netted a profit of $30,000.

A new hospital for women and children recently founded in Paris by M. Henri de Rothschild is provided with an automobile ambulance.

An alcohol congress in connection with the Paris Automobile Show was opened at the Grand Palais on December 17 by M. Michel Levy.

At the recent Paris Automobile Show out of fifty-two firms exhibiting gasoline automobiles, five employed ignition systems in which batteries and magneto generators were used together, seven used magnetos only and forty storage batteries or dry batteries.

The French Minister of the Colonies has arranged for the training of a number of sailors as automobile drivers, at factories, for eventual employ in the colonies.

At a banquet of the A. C. F., M. Michel Lagarde, French commissioner to the St. Louis Exposition, urged automobile manufacturers to be represented there in 1904.

M. Eichen, one of the exhibitors at the Paris Show, has sued the show management for $10,000 for representing him in the show catalogue as exhibiting "piles et accumulateurs d'Allemagne" instead of "piles et accumulateurs d'allumage."

The secretary of the A. C. G. B. and I., Mr. Claude Johnson, has handed in his resignation, to take effect June 2 next. Mr. Johnson states that his reasons for resigning are that he wishes to find a post the possibilities of which are less limited than those of a club secretaryship, and that he has not yet made any arrangements as regards the future. Could not the club extend the "possibilities of the secretaryship" to accommodate the ambition of Mr. Johnson?

A recent communication in the London *Times* furnishes a good example of the exaggerations frequently indulged in by some opponents of the automobile:

"At a few minutes after 4 o'clock this (Friday) morning there occurred in this neighborhood, and not by any means for the first time, such a rumbling, thundering sound, and such a vibration of the whole house and its contents, as most effectually to arouse, not to say alarm, every occupant herein. The cause was a motor traction machine, which shook the house to its very foundations and caused the bed upon which for a short three hours I had been sleeping to rattle and vibrate like a dinner gong struck by a drumstick."

A. C. A. Matters.

At a meeting of the race committee on January 5 it was decided that entries for the international cup race will close on February 1 and that all the machines of entrants must be in New York by April 11.

W. E. Scarritt, president of the American Automobile Association, and one of the most prominent members of the Automobile Club of America, has been chosen president of the Pan-American Automobile Company, in which A. C. Bostwick is largely interested. The company manufactures the Pan-American automobile, which will now be manufactured in large quantities for the coming season.

The Doctors' Number of THE HORSELESS AGE will be on sale at the Crystal Palace Automobile Show, Sydenham, London, England, from February 1 to February 7.

N. A. A. M. Affairs.

At a meeting of the entertainment committee on January 5 to arrange details for the annual dinner on January 23, Winthrop E. Scarritt, president of the American Automobile Association, was elected toastmaster. A partial list of speakers includes John S. Wise, F. Smith, A. R. Shattuck and F. S. Fish.

On January 7 nominations for members of the executive committee to serve a three year term were made as follows: H. Ward Leonard, of the Ward Leonard Electric Company; Windsor T. White, White Sewing Machine Company; Lucius C. Gibbs, Vehicle Equipment Company; F. S. Fish, of Studebaker Brothers Manufacturing Company; J. H. Page, of the J. Stevens Arms and Tool Company, in place of Walter C. Baker, of the Baker Motor Vehicle Company. These will be voted upon at the annual meeting. The Ajax Motor Vehicle Company, New York, and the General Automobile and Manufacturing Company, Cleveland, were elected to active membership, and the New York Edison Company and F. W. Devoe & C. T. Raynolds Company, New York; the Badger Brass Company, Kenosha, Wis.; Fisk Rubber Company, Chicopee Falls, Mass., and K. Franklin Peterson, Chicago, were elected associate members.

A special committee was appointed to investigate suggestions made for standardizing lamp brackets on automobiles.

Several amendments were proposed to the constitution and bylaws.

It was voted to send invitations to attend the good roads convention at Chicago, in February, to United States Senators and Representatives and to all who are prominently identified with the movement.

Secretary Unwin proposed a scheme for a special train to carry the automobile exhibits from New York to the Chicago show. Space that will require twenty cars has been bespoken.

A. A. A. Annual Meeting.

The American Automobile Association has sent a circular to all the automobile clubs of the country, from which we extract the following:

The automobilist of today is occupying the precarious position of the pioneer. The introduction of the self propelled vehicle on our highways is an innovation which is strongly resented by many of the present users of the highway. The proper use of the highway by the automobile is exactly as legitimate as that of any other method of travel. It has the same rights on the highway as the horse driven vehicle—no more. Courtesy and common impulses of human nature, however, would dictate that it should be used with the utmost consideration for the rights of others; especially should this be true when driving through congested districts or when passing horses that may become frightened or restive. After the utmost care and consideration, however, are shown, there still remains the unreasonable road hog to be dealt with. He in his narrow minded spite and prejudice would banish the automobile from the highway altogether. Too often we find small minded magistrates of the same calibre that delight at an opportunity to impose excessive punishment upon automobilists, regardless of their innocence or guilt. For self protection, therefore, the automobilists of the country should have some organization representative of the entire body that could look after, protect and defend the interests of automobilists wherever seriously menaced. In union there is strength and the strength of one should be the strength of all. How can this desirable result be better accomplished than in a well organized, clean cut, compact, businesslike national organization? It is not intended that the national organization should by any means undertake to defend the case of every automobilist who might be arrested for violation of the law, but the national organization should be prepared to interest itself in cases where flagrant injustice was clearly manifest and seek to have reversed any judicial decisions which were clearly wrong.

This and many other desirable results may be brought about by the hearty cooperation of the various clubs throughout the United States. No club is so small or obscure, or so powerful or influential, that it can afford not to belong to the national organization.

This appeal, which it is hoped may prove a rallying cry, is sent to those clubs which are not members of the Association, as well as to those which already belong. If this matter appeals to you and you are in sympathy with the general purpose of the organization, may we not hope to have the pleasure of meeting your representative at the annual meeting?

A C A.'s Spring Contest.

Under date of January 10 S. M. Butler, secretary of the A. C. A., sent out the following circular letter: "It is the intention of the Automobile Club of America to hold some time in the spring a contest for commercial vehicles. The contest committee of the club are desirous of meeting with the manufacturers of trucks and delivery wagons and all types of commercial vehicle to receive suggestions to aid them in formulating rules for such a contest, and have appointed Thursday, January 22, 1903, at 4 p. m., at the clubhouse, 753 Fifth avenue, New York, as the time and place for such meeting. Kindly advise us if you are in sympathy with such a contest and if you will attend the meeting and give us your suggestions."

J. Herbert Carpenter, Ossining, N. Y., has one of the few private garages so far built in this country. The garage is gotten up in the best possible manner for storing and taking care of his automobiles.

Book Reviews.

The Practical Gas Engineer. By Longanecker, M. D. Second Edition lished by the author.

The author of this work is co with a concern manufacturing sta gas engines, and the aim of his w chiefly to furnish the information ne to properly operate such engines, wh usually cared for by non-engineers. thor states in the preface that he l lected data in reference to the const equipment and troubles of gas which are of special interest to the p tive purchaser and operator, and has compiled in this book data cove the questions that arise from the p er's, owner's and engineer's stadpo

As the book is written with speci ence to stationary practice it does peal directly to the automobilist, a of course, the same principles which lie the construction of stationary gines are also the basis for the d automobile engines of the explosive

The book is divided into six parts lows: Part I, Introductory; Part I struction; Part III, Equipment; I Gas Engine Troubles; Part V, Gen formation; Part VI, Dynamo and Ignition. It is of pocket size and 124 pages of matter and an ind information is given in concise f we have no doubt that the book object, which is, moreover, prove fact that a second edition has be necessary in a short time.

Good Roads: How To Make a to Maintain Them. By Thomas Assoc. M. Inst. C. E. With a duction by the Council of the Iris Improvement Association. Publ the Irish Roads Improvement As 14 Lombard street, Belfast. Price,

The Irish Roads Improvement tion have issued this pamphlet in that it will draw the attention, pa of those who are responsible for th of the public roads in Ireland a many advantages of efficient co and maintenance. The pamphlet a number of articles on the constr roads and their maintenance, an efficiency of different road mat also gives a description of the via instrument for testing the evennes surfaces, invented by J. Brown, o and a number of records (viagr reproduced as obtained by means strument. The pamphlet is illustr a number of drawings, showing methods of road construction half-tones illustrating operations construction in Ireland.

Ignition Devices for Gas and F tors. By S. R. Bottone. Pub Guilbert Pittman, Cecil court, Cross road, London, W. C.

The contents of this book a serial form in the ***English Me***

summer. The author considers the various systems of ignition now in use on explosive engines of automobiles. The book contains ninety-two pages and sixteen illustrations, partly half tone and partly line cuts. Jump spark and touch spark methods are described, as well as oscillating magnetos and dynamo spark generators. The construction of spark coils, tremblers and other parts of an ignition outfit is described in detail. The cuts are rather poor, but the price of the book is low—3 shillings 6 pence.

A Special Steam Stanhope.

The accompanying half tone is an illustration of a steam vehicle which was built for Dr. S. C. Blaisdell, a Brooklyn practitioner, by Blaisdell & Co. The doctor to date has owned a number of light steam vehicles, which he used in his practice, which have given him good service. However, in time, many structural weaknesses were discovered and the machines were disposed of. The new carriage is of substantial construction throughout and weighs a ton or thereabouts, inclusive of supplies.

SPECIFICATIONS OF THE CAR.

The wheel base is 80 inches, and though it is long the builders propose to lengthen it out by moving the front axle further forward. The tread is standard and the wheels, which are of the artillery type, are shod with 28x3 inch Dunlop clincher tires. The front wheels are equipped with Timken roller bearings. The drivers are keyed to their respective driving spindles, which revolve in roller bearings located at either end of the tubular rear axle. A spur gear differential is employed. It is driven by a sprocket which is located between two double acting brake bands. There are no reaches in the running gear, but distance rods are used. All the body springs are full elliptics and 36 inches long.

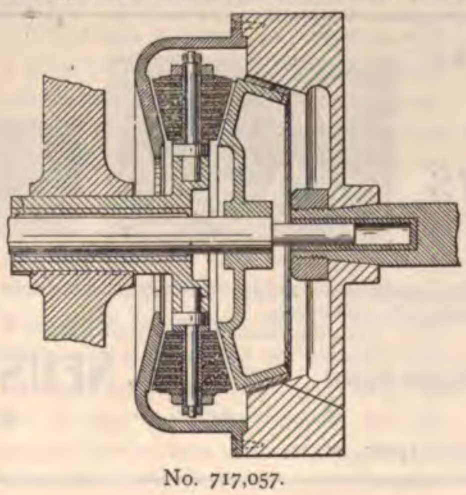
The boiler is unusually large and is rated at 15 horse power. It is a "Salamandrine" water tube generator, and, according to the doctor's experience, cannot be burned out. The engine is a "Toledo" and is said to develop 7 horse power at 150 pounds steam pressure. No air tank is provided. The water tank holds 43 gallons and the fuel tank 15 gallons of gasoline. A single lever controls the throttle and the Stevenson links. A Moore combination air and water pump is employed as an auxiliary to the engine's pumps. In the fuel tank a pressure of 60 pounds per square inch is carried. This tank, which is of copper, is located under the convertible boot in front. Special features of the carriage are the valves by which the diaphragm may be cut out and the valves under the footboard, by means of which the supply of fuel to the pilot light and main burner may be controlled. Should the burner fire threaten the woodwork of the body these valves may be closed and the flames extinguished without endangering the operator.

Steering is done by means of a wheel. The gear reduction of the device is of the pinion and sector type.

MOTOR VEHICLE PATENTS..

717,057. Reversing Mechanism. — William W. Tuck, of Richmond Hill, and August Wassmann, of Astoria, N. Y. December 30, 1902. Filed February 28, 1902.

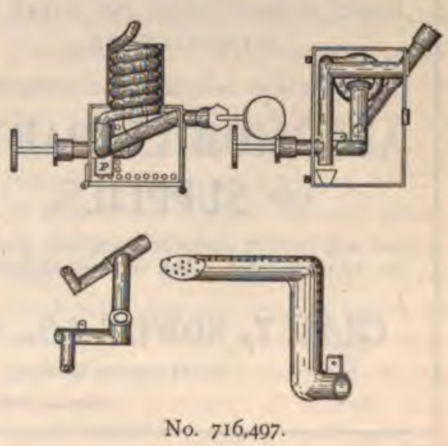
A conical friction clutch is combined with a friction reversing gear. The engine flywheel forms part of the conical friction clutch and has bolted to it a casing with a bevel friction surface on its inside. The cone of the friction clutch is provided with a similar friction surface, and between the case and the cone are mounted a set of conical friction wheels of millboard. It is obvious that when the cone of the clutch is drawn out of the flywheel and forced into engagement with the friction wheels driving connection is re-established, but with the direction of transmission reversed.



No. 717,057.

716,497. Hydrocarbon Burner.—H. L. Warner and W. H. Lonsdale, of Dayton, Ohio. December 23, 1902. Filed July 25, 1901.

Relates to the "Dayton" generator and pilot light. The pilot burner and generator for the main burner are arranged in a rectangular sheet metal box located at the side of the burner and in a tubular connection between this rectangular box and the main burner case. The gasoline arrives at H through a tube passing through the main burner case, passes through a helical coil encased by a tube and then into a distributing pipe, from which branch off two passages, one leading to the nozzles of the main burner and the other to the nozzle of the pilot light. The former passage is controlled by the horizontally arranged needle valve in the drawings herewith and the latter by the slanting needle valve. The pilot burner is constructed as shown by the



No. 716,497.

sketch in the lower right hand corner, the end of the burner extending into the vaporizing coil. A cup P is located below the passage leading to the pilot burner. In starting the pilot the horizontal needle valve is opened and gasoline is allowed to flow into this cup, which is then ignited by a match. The sheet metal case is provided with openings for the admission of air to the pilot light and with a door on its outer side for inspection, etc. The cut on page 115 shows the distributer tube.

716,907. Resilient Tire for Wheels.—Jean P. Legrand, Levallois-Perret, France. December 30, 1902. Filed March 26, 1901.

716,928. Variable Speed Gear.—Joseph M. Ough, San Francisco, Cal., and Montgomery Waddell, New York, N. Y. December 30, 1902. Filed September 27, 1900.

716,929. Variable Speed Gear.—Joseph M. Ough, San Francisco, Cal. December 30, 1902. Filed March 20, 1901.

716,930. Variable Speed Gear.—Joseph M. Ough, San Francisco, Cal. December 30, 1902. Filed March 20, 1901.

716,960. Metallic Tire.—William Thompson, Woodstock, Canada. December 30, 1902. Filed June 11, 1902.

717,079. Device for Transmitting Rotary Motion to Vehicle Wheels.—Oliver Cluts, Cuba, Ill. December 30, 1902. Filed August 2, 1902.

717,107. Secondary Battery.—William Morrison, Chicago, Ill. December 30, 1902. Filed May 19, 1900.

717,108. Secondary Battery.—William Morrison, Chicago, Ill. December 30, 1902. Filed August 5, 1901.

717,165. Device for Inflating Tires of Vehicles. Ida B. Catlin, Philadelphia, Pa. December 30, 1902. Filed June 28, 1902.

717,204. Vehicle Wheel.—Charles W. Hunt, West New Brighton, N. Y. December 30, 1902. Filed October 1, 1902.

717,235. Friction Power Transmitting Mechanism.—George W. Marble, Buchanan, Mich. December 30, 1902. Filed May 12, 1902.

717,260. Steam Generator.—Randolph M. Oates, Paris, France. December 30, 1902. Filed August 8, 1902.

717,263. Protector for Rubber Tires.—Herbert R. Palmer, Cleveland, Ohio. December 30, 1902. Filed August 27, 1901.

717,264. Pneumatic Tire.—Herbert R. Palmer, Cleveland, Ohio. December 30, 1902. Filed October 11, 1902.

717,292. Throttle Valve.—Charles I. Shawver, Springfield, Ohio. December 30, 1902. Filed July 14, 1902.

717,351. Storage Battery.—Charles H. Clare, Quincy, Mass. December 30, 1902. Filed March 1, 1902.

717,416. Secondary Battery.—Isidor Kitsee, Philadelphia, Pa. December 30, 1902. Filed April 10, 1893.

717,417. Gasoline Engine.—Ernest E. Koken, St. Louis, Mo. December 3[0] Filed June 14, 1901.

717,421. Steering Device for Vehi[cles] Herbert J. Leighton, Syracuse, N. Y[.] [De]cember 30, 1902. Filed October 29,

717,430. Transmission Frame for [Auto]mobiles.—Henry K. Milner and Jo[...] Lansden, Jr., Birmingham, Ala. [Decem]ber 30, 1902. Filed August 2, 1901.

717,466.—Electrical Igniter for Ga[s En]gines.—Elliott J. Stoddard, Detroit, December 30, 1902. Filed October 1[...]

The automobile dealers of Bosto[n held] a meeting on January 5 and decided [to or]ganize a local board of trade. H. E[...]vin was elected temporary chairma[n and] C. I. Campbell temporary secretary[. The] matter of adverse legislation was c[onsid]ered and a committee, consisting of [...] Fosdick, J. W. Dingley and A. J. C[...] was appointed to confer with the [Massa]chusetts Automobile Club on the [...] Another committee, consisting of [...] Eldridge, C. I. Campbell, A. T. Full[...] G. Reed and C. H. Wilson, was app[ointed] to draw up constitution and by law[s and] report at the next meeting, on Janu[ary ...] Still another committee, comprising [Ken]neth A. Skinner, C. Bates and F. E[...]dall, was appointed to consider the [advisa]bility of holding a race meet in the [...] either in conjunction with the Mas[sachu]setts Automobile Club or independe[ntly.]

THE HORSELESS AGE

...EVERY WEDNESDAY...

Devoted to Motor Interests

VOLUME XI NEW YORK, JANUARY 21, 1903 NUMBER 3

THE HORSELESS AGE.

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The Madison Square Garden Show.

The third annual automobile exhibition at Madison Square Garden, New York city, as far as can be judged at the present writing, is proving a far greater success than either of its two predecessors. The building is literally crowded with automobiles "from cellar to garret," complete vehicles being shown not only on the main floor but also in the basement and on the galleries. It is only a pity that the space available for exhibition purposes is so inadequate that the demands of the rapidly growing industry could not be fully met.

After last year's show it was observed as a sign of the times that many manufacturers were taking up the construction of heavy high powered touring cars, mostly patterned after French designs, and this tendency to turn from the more practical medium weight machines was deplored by not a few. The big touring car is even much more in evidence at this year's show than at the preceding one; in fact, comparatively few runabouts are to be seen on the main floor. But from the course of events of last year it may be concluded that a New York city automobile exhibition does not give a correct view of the relative importance of the various branches of automobile manufacture, the reason probably being that the attendance at such a show is not an average automobile buying public, the metropolitan society element predominating, and among out of the city visitors the experienced user. The former element, of course, is interested particularly in the more luxurious productions, and the latter usually look for more power and greater speed in their successive vehicles.

It is always of interest in connection with a show of this kind to note the relative representations of the various motive powers, and compare them with the respective representations of the year before. At this year's show gasoline propelled vehicles are predominating; steam has fallen off considerably since last year, while electric vehicles are considerably better represented. Were it not for the fact that, as stated, the exhibits of the show do not correctly represent the activity of various branches of the industry, one might conclude that the original type of light runabout steamer had practically ceased to be manufactured. Most of the exhibitors of steam vehicles have something new in the line of touring cars fitted with condensers, which enable the car to run on one supply of water a distance nearly equal to the range on one charge of supplies of the average gasoline car.

A review of the gasoline exhibits discloses the fact that a few of the makers have tried to imitate the latest European practice. Most of the cars which show signs of this tendency appear to have been rushed through in a great hurry and are lacking somewhat in finish and attention to details as compared with other cars of the same motive power the designs for which have been in hand a longer time. In general it may be said that the spirit of imitation is less in evidence at the Madison Square Garden Show than it was at the late Paris Show, according to the reports.

Comparing the vehicles exhibited generally with those at former shows, the average price is considerably higher, the power is greater, the bodies are more comfortable, the outlines are more pleasing, the finish is better and the mechanical design is better adapted to the various requirements of road work. For high powered gasoline touring cars the four cylinder vertical motor arranged in front is employed by the majority of manufacturers, but in the lighter class of vehicles the horizontal motor is well holding its own. Striking variations from previous practice there are few; but it is observed that acknowledged improvements in construction which have so far frequently been avoided on account of the higher cost are now being adopted to a large extent. Among these are the substitution of wood wheels for wire wheels, the fitting of hub brakes, increase in radiating surface, the use of positively driven circulating pumps and, to some extent, the cellular cooler, which has become so popular in Europe. We noticed that the appearance of a number of otherwise well finished cars is considerably detracted from

by imperfectly finished radiating coils, and one advantage of the cellular cooler over the flanged coil would be that it would allow of more mechanically appearing and better finished construction.

Chassis and separate engines and parts are shown on a great many stands, and the old notion that "it would not do to show the mechanical construction" has evidently been exploded.

The greater number of exhibitors have vehicles outside the Garden for demonstration purposes; but unfortunately so far it has been so cold that it has not been very pleasant to ride outside in an open vehicle. It would have been an excellent opportunity under these conditions to advertise the merits of an enclosed vehicle; but this type seems to have received no more attention than in former years, except by the manufacturers of electrics.

Frame Construction.

There has been considerable experimentation in frame construction, but a final form has not yet been arrived at. The forms of construction which have received extensive trial include the following: Tubular steel, angle steel, channel steel, steel flitched wood, plain wood, pressed steel, and square steel tube with wood filling. All of these forms are still more or less in use, but some are declining in popularity, while others are gaining. Tubular body frame construction is now seldom met with, the objection to it being the difficulty of properly fastening the mechanism to it. Plain angle steel is also rarely employed, as angle steel lined with wood furnishes a construction better able to withstand shocks and weighing less for a given strength. The steel flitched wood frame was almost universal with leading French makers the last year, but this year pressed steel construction seems to be in the lead with these same makers. Pressed steel frames necessitate a more expensive manufacturing equipment than any of the other forms of construction, and if such frames should prove mechanically superior to the other kinds they are likely to gain in popularity as automobiles are manufactured in greater number after the same pattern.

The conclusion to be drawn from the results of experiments so far and the various changes made is that a combination of wood and steel in some form makes the best frame for automobiles, the steel providing the necessary rigidity for connections, making it impossible for the parts attached to the frame to be displaced thereon, and the wood giving the whole frame a certain elasticity, which is beneficial alike to the life of the frame and to the proper operation of the machinery placed thereon. That a combination of wood and steel makes the most durable structure for a road vehicle had already been discovered by carriage builders and has now been reaffirmed by the experience of automobile manufacturers. There are, however, a great many possible variations in the combination of wood and steel for this purpose and the problem now is to determine the most suitable combination, having regard to cost of manufacture, strength for a given weight and durability.

Artillery Wheels.

Visitors to the show in Madison Square Garden will note an increase in the use of artillery wheels as compared with wire wheels over previous years. The artillery wheel, whether wood or tubular steel, is a more expensive wheel than the suspension type, and the more general adoption of the artillery type signifies that automobile manufacturers have reached the conclusion that in the matter of wheels general practicability and not cheapness should be the deciding factor.

The only valid objection to the wire wheel, properly made and proportioned to the load it is to carry, is the difficulty of keeping it clean. Of course, much trouble has also been experienced from spokes breaking, but this has mostly been due to the use of too light spokes. And the trouble is usually aggravated by an arrangement of axle bearings making it impossible to replace spokes while the wheel is in position. That there need be but little trouble from the breaking of wire spokes is well shown by the experience of users of one of the earlier heavy machines which was equipped with suspension wheels. The spokes of these wheels were quite heavy and some of the vehicles have been in use for several years without ever having broken a spoke.

But the difficulty of keeping the spokes of a wire wheel clean and free from rust is a very serious objection to it, with most people at least. If the wire wheel is regularly well cleaned to keep it from rusting, the expense of such cleaning will in a short time make up for the difference in cost as compared with an artillery wheel. An artillery wheel therefore adds to the value of a vehicle, and for this reason is being adopted by most manufacturers.

The Madison Square Garden S

That unmistakable tribute of pop
and interest, the attention and atte
of the public, was paid to the ho
vehicle in a manner unprecedented
history of the industry at the open
the Third Annual Automobile Sh
Madison Square Garden on Saturday
ing last.

The vast hall was uncomfortably
ed with the thousands who had
drawn there to see the exhibits, the v
types and styles of automobiles, whic
resented in toto the product of Am
mechanical brains devoted to the s
of automobile problems.

For a man technically inclined t
was a perfect garden of new kn
and new contrivances, all tending t
American automobiles what they
tively intended to be, the standar
world.

To the experienced chauffeur, th
user and the prospective purchaser
no end of things interesting and t
tive, and the only trouble seemed
that when among so many desirabl
it was hard to settle on any pa
make as just the proper one.

The attendance of the first night
anything that has ever been experien
automobile shows on this side of t
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there were more people in Madison
Garden on Saturday night alone
ited the Western show during
time it was open.

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in every detail.

It was remarkable to note th
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cars, with their luxurious King o
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The general trend of improvemen
the 1902 models seems to be almos
versal with the various manufacture
great majority of whom have inc
their wheel base to insure easier
qualities, built their bodies lighte
strengthened their running gears and
missions. There has also been a noti
tendency to make all bearings broad
heavier and to provide a means of
up lost motion and natural wear.

Considerable thought has been gi
simplifying and strengthening of tra
sion gears, and also to making the act
clutches more positive. One thing t

particularly noticeable is the enlarging of radiating coils and placing them in exposed positions in the front of the machines. In a number of tonneau types the water is cooled by the well known Mercedes fan system.

The mufflers in many of the machines have been enlarged to minimize the back pressure, while a number of the manufacturers furnish a cutoff, or relief valve, to be used when additional power is needed to climb hills or negotiate muddy or sandy roads.

The troublesome spark breakers, which in last year's types were exposed to the dust and dirt, are in many cases enclosed in the 1903 models in dustproof cases.

Perhaps the one thing most demonstrative of the fact that the auto's popularity is not to be transitory is the deep study that the various systems of horseless transmission have received from the thousands of persons interested. It was evident from listening to the conversation of the men, and in many cases the women, who were viewing the various machines that they were not talking in the dark and that they had some knowledge of automobiles.

The apparent ignorance of past seasons seemed in a great measure to have disappeared, and would be purchasers, instead of standing about open mouthed and drinking in the "hot air" of the expert salesmen, were seen "spooking" about in and among the machines, asking that motor bonnets be lifted, floor board be pulled up, transmission gears and clutches exposed, and demanding to see what provision had been made to take up lost motion on bearings and to adjust parts that were likely to need it.

The crowd was an inquisitive one, but it was plainly to be seen that they did not intend to buy a "pig in a poke," and the salesmen were kept busy answering questions of not "how fast will she go?" but more often "what will it cost to run her and how far will a gallon of gasoline go?"

The old idea of letting "her" eat up all the oil and gasoline that could be forced through the engine has to a great extent disappeared, and the question of economy of operation seemed to be the one most considered.

There were, of course, the usual crowd of persons, curious and otherwise, around the expensive imported exhibits and the mile a minute class; but for the greater part the light weight runabouts and medium priced touring cars received the most attention.

While standing near a well known machine, under 10 horse power, a sale was made which demonstrated clearly the fact that endurance contests result in the selling of automobiles and do their fair share toward shaping public opinion favorably toward horseless vehicles. A gentleman had just placed an order for the car in question and was telling his reasons for buying that particular make. "I saw your machine climb the Leicester hill during that run from New York to Boston, and I made a note of the number on it. The way she went up the grade convinced me that your machine was about what I wanted, and when I got a paper and saw what make it was I decided to have one of them, and I came to the Show especially to look the thing over carefully and order it."

This is only one instance that came to light, but there is no doubt that the publicity given by the press of the country to such events, and then the descriptions of

General View of Main Hall from the West.

the run in trade papers by their men who act as observers, are doing no end of good in popularizing the auto and sweeping away the peevish opposition of men who oppose every new departure and improvement, mainly for the purpose of being obstinate.

The fact that no gasoline was allowed in the building prevented many of the exhibitors, and particularly the manufacturers of motors, from displaying their products in action. This exclusion of the "staff of life" for horseless vehicles resulted in a most lively scene just outside of the Garden, where automobiles of all makes and types were lined up to be used as demonstrating carriages.

The exhibitors were very careful not to encourage the practice of giving rides to persons merely inquisitive, and generally demanded some assurance that the party seeking to be taken out was interested in the particular make of machine in which he sought to ride.

One progressive exhibitor who had been forced into the basement with his rather expensive machine had a copy of Bradstreet's on his desk, so prominently displayed that persons of not the best financial standing could scarcely help but see the book and take the hint. The electrical decorations over the various exhibits were attractive, and many of them original, and one concern, to be a bit ahead of the rest, had a monster painting made which depicted their particular car in the midst of a most lonely and isolated district climbing up what appeared to be a 90 per cent. grade, which ended rather abruptly in clouds ethereally beautiful.

The catalogue and souvenir collecting craze was on in full force, and there was scarcely a person who left the hall without being laden down with a hundred or more pamphlets and dozens of small novelties presented by the exhibitors in the way of advertisements.

A complete tour of the big show, with its panorama of steam, gasoline and electric vehicles, small buckboards, overshadowed by monster touring cars, auto 'buses, auto trucks and auto runabouts capable of transporting anything from a bottle of cough medicine to a hogshead of molasses, leaves the lasting impression that automobiling is to be America's national sport, and that the automobile is destined to be the greatest factor of the twentieth century in all lines of city and country transportation. It is self evident that a few more years of brainy effort expended along the present progressive line must result in a pleasure vehicle, medium priced, durable and reliable, that will take the place of the horse for general use, an ideal physician's wagon and no end of trucks for use in mercantile lines that will do double the work of horses under all conditions of weather, with greater convenience and reliability and with materially less cost. The automobile will from now on play an important part in the affairs of life, and the attention given it this week by the entire public press is fully merited.

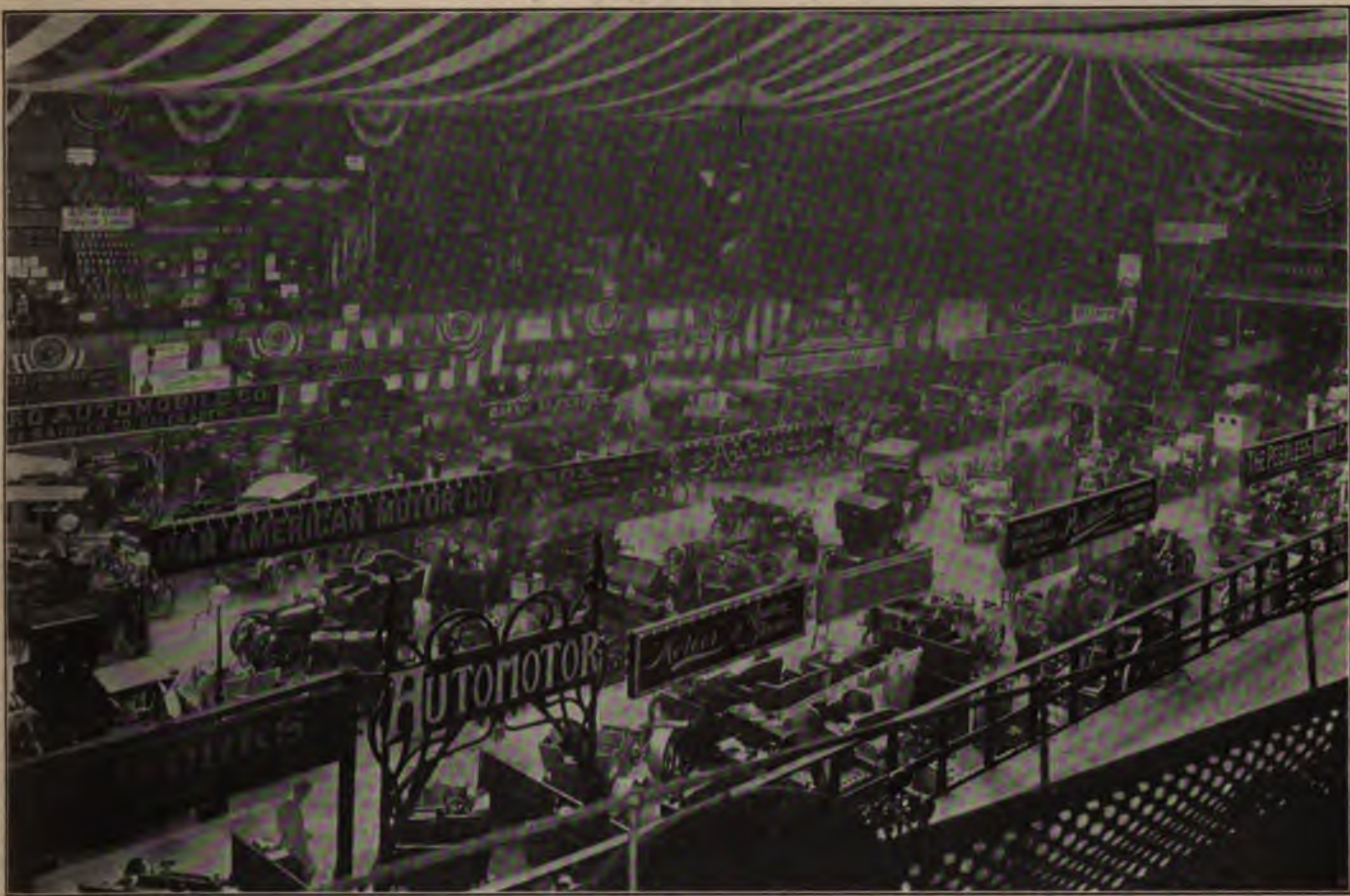
View from the Gallery (Northeast Corner).

Some of the Exhibits.

THE WINTON MOTOR CARRIAGE COMPANY.

The Winton exhibit, apart from its cars, is noticeable on account of its fittings and decorations. The exhibit comprises two of the new 20 horse power touring cars, a chassis of the same car and the "Bullet" racer, carrying a placard with the information that the car to be built to compete for the Gordon Bennett Cup will be equipped with a horizontal engine.

Although the new 20 horse power car is in its general lines quite similar to last year's touring car, it differs in several details of construction. The hood has been



Two Views in the Main Hall, Taken from the Galleries on Opposite Sides.

somewhat shortened and heightened, the front seats are divided and the tonneau is considerably increased in size, the back and door being about 30 inches high. The body is completely spring upholstered, and presents a much more comfortable and roomy appearance than previous models. The springs are heavier and longer, the the wheel base is increased 6 inches, insuring greater ease of riding. A continuous mud guard over both front and rear wheels of each side adds greatly to the general appearance.

The motor being increased to 20 horse power has a much more powerful and rigid appearance, especially since the cylinders, crank case and pump are cast in one. Either piston can now be removed without first taking out the crank shaft.

Among the minor changes noticed are that the cranks are now of steel, the steering gear is strengthened, and the wheel is pivoted to the post so it can be swung out of the way in entering the car; the change gears have been increased in size so as to give greater speed; a ratchet lock has been added to the foot brake, and a glass cover is placed over the commutator, thus rendering it dustproof, but at the same time perfectly visible. A tool box suspended from the front of the frame makes access to tools and supplies extremely handy.

A feature of the car that is causing much comment is an emergency brake applied by throwing the high speed lever forward past its neutral position. This operates a hand brake binding upon a drum attached to the friction plate of the flywheel clutch. In making short stops, or rapidly decreasing the speed when running on the high speed, this feature should be found of great advantage.

In the general construction no radical changes are noted; the distinguishing features of the Winton system, such as gears, clutches, chain drive, air control of admission valves, etc., being about the same as in the 1902 model.

THE BERG AUTOMOBILE COMPANY.

Occupying space in connection with the Vehicle Equipment Company is the exhibit of the Berg Automobile Company. As this is the first appearance of the car it is causing considerable comment among the automobile fraternity.

Four cars are shown in the Garden—a 15 horse power car finished in natural wood with tonneau capable of seating four persons; a 15 horse power tonneau with detachable top which converts the car into a closed coupe; an 8 horse power tonneau and an 8 horse power charette in which the rear seats are entered by swinging back the seat next the operator. A fifth car, a 15 horse power tonneau, is used on the street for demonstrating purposes.

The 15 horse power machines have a four cylinder motor, four speed change gears and reverse, and use a chain drive to the rear wheels. The 8 horse power cars have two cylinder motors, a three speed change gear and reverse and are driven by a bevel gear on a live rear axle. All gears are of the sliding type, one lever operating all the speed changes and reverse. The drive on the highest speed of both sizes is direct from engine to wheels, no gears being used.

The cars present several novel features, the carburetor, throttle control and distributing commutator being the most important. The carburetor is quite similar to the Panhard. Gasoline and air are automatically shut off at the same time, thus keeping the mixture constant at all times. The distributer is entirely new in design, depending upon the centrifugal force of the rotating contact spring to increase the contact when the engine is running at extremely high speeds. The throttle is operated by a small lever placed on the steering post standard, but no matter what its position it is immediately opened wide on applying the accelerating pedal, returning to the position in which it was originally set when the accelerator is released. This is found to be most advantageous in running through crowded city streets when it is necessary to be constantly changing the speed to dodge traffic.

The Loyal type of multi-tube radiating coil, which may be found on several of the later models, is used on these cars. In all sizes independent induction coils are provided for each cylinder.

It is the intention of the company to furnish one of the two standard chassis, the body and finish being optional with the buyer. Designs and drawings of a number of different bodies are shown at the exhibit.

THE PEERLESS MOTOR CAR COMPANY.

The Peerless Motor Car Company are showing a 25 horse power tonneau, a 16 horse power tonneau, with divided front seats, and one with a straight seat, and the chassis of a 16 horse power machine. The 25 horse power car is one of the largest seen at the show, and is proving one of the centres of attraction to visitors. In point of construction it differs from the 16 horse power car very slightly, being provided with four cylinders in place of two, and having strengthened the parts subjected to extra strains due to increased power.

The 1903 model differs in many ways from last year's car, one of the most radical changes being in the adoption of sliding type of transmission gears in place of friction clutch operated gears.

The bonnet is long and square, resembling the Mercedes in general outline. The motor is of the two cylinder vertical type, develops 16 horse power at a normal speed of 900 revolutions per minute, and is capable of considerable increase by accelerating the engine. An automatic centrifugal ball governor works on a throttle valve located in the inlet valve casing.

The car has three speeds forward and a reverse, operated by one lever. An ingenious mechanical device prevents the being shifted without first throwin the clutch.

Two brakes are provided, one op by a foot pedal, and acting on a dru tached to the countershaft of the c gears, and a second acting on the tw wheels, operated by a lever placed n the gear shifting lever. Both brak tomatically release the flywheel when applied.

A universal joint and bevel drive mits the power from the gears to rear axle, which is provided with fl joints to do away with any strain tha arise from rough and uneven roads.

The radiating coils and water ci tion system are of a special desigr are claimed to be very efficient, 4 g of water being sufficient for an a run. The cooling system is greatly by means of fan placed directly b the radiating coils, as seen in so m this year's foreign cars.

THE FIAT AUTOMOBILE.

O. H. Keep, Jr., as sole agent f Fiat automobile, manufactured by a ian firm, is showing the only car present time in this country. It is a tonneau with individual front seats general appearance of speed and co However, it is the intention of Mr. to import only the chassis from Ital body and accessories being optiona the purchaser.

The chassis consists of a wooden reinforced by light steel plates, from are hung the motor, gears and a working parts. The motor has four cal cylinders, 4 inches bore by 5 stroke, developing 16 horse power running at 900 revolutions per min normal speed. Only the exhaust are mechanically operated, the inlet being operated by suction.

A make and break spark is used fo tion, electricity being furnished by namo. In starting a storage batt used, which is automatically throw of circuit when the motor attains su speed.

The speed gears are one of the striking features of the car. Unlike of the foreign transmissions which e sliding gears, the Fiat gears are alw mesh, yet are perfectly positive in th tion. The speed gear changes con three forward speeds and a reverse, ing operated by one lever.

The transmission of power fro clutch to the gears is also a peculia ture of the car. In place of a uni joint connecting the male portion clutch to the driving shaft, a large of leather is used which answers quirements of a universal joint, at the time absorbing all shock usually felt throwing in the clutch.

A feature that is not seen on most ican cars is an automatic control point of ignition, there being no me shifting the spark by hand.

Specifications of the New Vehicles at the Show.

Realizing that it would be quite impossible to give full descriptions of all the new models of vehicles making their appearance at the show, we give below brief specifications of the leading product of each exhibitor of automobiles. We have striven to observe in these specifications as much uniformity as possible under the conditions. We expect to give complete descriptions of most of these vehicles at least during the winter and spring.

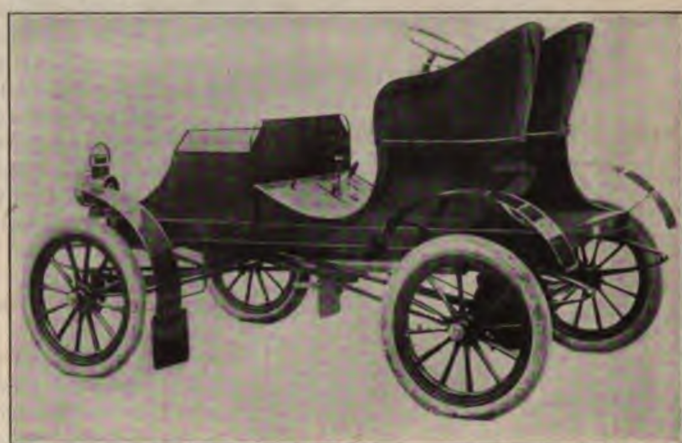
CONRAD MOTOR CARRIAGE CO.

Gasoline Runabout — Specification: Reachless tubular steel running gear, with four elliptic springs and 1½ inch angle iron body frame; spur compensating gear; one-double cylinder, vertical motor in front; sliding gear transmission; three speeds forward and reverse; double acting brake on differential; rear hub brakes; jump spark controlled by hand; tonneau body.

FOURNIER-SEARCHMONT AUTOMOBILE COMPANY.

Tonneau Touring Car—Specification: Armored wood running gear frame, with angle iron engine support; semi-elliptic springs; 81 inch wheel base; 56 inch tread; 32 inch wood artillery wheels; 3½ inch Diamond detachable tires; 10 horse power, double cylinder vertical motor of 4½ inches bore and 5 inches stroke, located under a bonnet in front; jump spark ignition automatically controlled; magneto generator; single float feed spraying carburetor; shifting gear transmission; four speeds ahead and one reverse; range of speed, 7 to 32 miles per hour; gasoline capacity, 19 gallons; water capacity, 14 gallons; geared pump; radiator coil in front; piston pump lubrication of all main bearings; transmission brake and rear wheel hub brakes; wheel steering.

SEARCHMONT TOURING CAR.



FRANKLIN LIGHT ROADSTER.

COLUMBIA 24 HORSE POWER GASOLINE TONNEAU.

ORIENT BUCKBOARD.

ELECTRIC VEHICLE COMPANY.

... half inch Diamond roller chain; double acting brake on differential; double cylinder vertical engine of 3½ inches bore and 3½ inches stroke; cylinder and head cast integral; sliding gear transmission; two speeds ahead and reverse; aluminum bronze friction clutch with leather friction surface; 78 inch wheel base; standard tread; 28 inch wheels, wire; 2½ inch Diamond tires; 1 inch axles; jump spark; float feed carburetor; automatic lubrication; copper tank under seat; 6 gallons gasoline capacity; 5 gallons water capacity.

Gasoline Touring Car—Specification: 84 inch wheel base; standard tread; angle iron frame, a single piece running all the way around; 30 inch artillery wheels, wood; 3½ inch clincher tires; 12 horse power

Gasoline Tonneau Touring Car, Seating Five—Specification: Weight, 2,700 pounds; trussed steel frame; hardened and ground axles running in bronze boxes; 93 inch wheel base; 56 inch tread; 34 inch wood wheels; 4 inch double tube tires; plain wheel bearings; 24 horse power, four cylinder vertical motor, of 5 inches bore and 5 inches stroke, running at 850 revolutions per minute, and located in front; sight feed forced engine lubrication; jump spark by magneto generator, controlled by hand; single float feed carburetor; shifting gear transmission; four forward speeds and reverse; range of speed from 4 to 45 miles per hour; drive by separate chain to each wheel; 6 gallons water capacity; positively driven circulating pump; 12 gallons gasoline capacity; steering by tilting hand wheel.

WALTHAM MANUFACTURING COMPANY.

Light Carriage Seating Two to Four—Was described and illustrated in THE HORSELESS AGE of November 26, 1902. In addition the company are exhibiting a motor buckboard which is said to represent the very simplest and lightest form of motor vehicle. The motor is of 4 horse power and is air cooled by means of a blower directly on the motor shaft. The machine will run at speeds of from 4 to 30 miles per hour, the speed being controlled by the foot throttle and spark lever. The weight is 350 pounds.

BERG AUTOMOBILE COMPANY.

Four Passenger Tonneau—Specification: Weight, 1,800 pounds; frame of armored wood; wheel base, 78 inches; tread, 52 inches; 32 inch wood wheels; 3½ inch tires (double tube); plain wheel bearings; 8 horse power, two cylinder vertical motor of 800 revolutions per minute normal speed; mechanical engine lubrication; jump spark

with hand control; single float feed carburetor; sliding gear transmission; three speeds forward and reverse; chain transmission; 8 gallons water capacity; centrifugal circulating pump driven by friction; 10 gallons gasoline capacity; irreversible wheel steering. Special features: New form of radiator, mechanical lubricator, new controlling device and a new form of hood attachment.

Six Passenger Tonneau—Weight, 2,300 pounds; wheel base, 90 inches; tread, 54 inches; 34 inch wood wheels; 4 inch double tube tires; four cylinder 15 horse power vertical engine, running at 800 revolutions per minute normal speed; four speeds ahead and one reverse; 15 gallons water capacity; 12 gallons gasoline capacity.

U. S. LONG DISTANCE AUTO COMPANY.

Tonneau Seating Four and Weighing 2,100 Pounds—Specification: Angle iron frame and semi-elliptic springs; wheel base, 80 inches; tread, 56 inches; 30 inch wood wheels; 3½ inch Diamond tires; plain wheel bearings; 12 horse power, two cylinder, vertical motor of 5 inches bore and 6 inches stroke, running at 600 revolutions per minute normal speed; positive pressure lubrication; make and break ignition with hand control; one float feed carburetor; planetary transmission; three forward speeds and reverse; range of speed, up to 35 miles per hour; bevel gear drive; 4 gallons water capacity; centrifugal gear circulating pump; 15 gallons gasoline capacity; wheel steering. Special feature: One lever control.

Runabout—Specification: Weight, 1,400 pounds; 73 inch wheel base; 57 inch tread; 30 inch wood wheels; 3 inch double tube tires; 7 brake horse power; single cylinder horizontal motor of 5 inches bore and 7 inches stroke, running at 700 revolutions per minute normal speed; direct engine lubricator; make and break spark controlled by hand; float feed spraying carburetor; planetary transmission; three speeds and reverse.

DURYEA POWER COMPANY.

Phaeton with Either Three or Four Wheels, for Two Passengers—Specification: Weight, 800 to 900 pounds; reachless running gear with semi-elliptic springs; 67 inch wheel base; 56 inch tread; 30 and 36 inch wheels; 3 inch Dunlop tires; ball bearings in front and plain bronze bearings in rear; 10 horse power, three cylinder inclined motor of 4½ inches bore and 4½ inches stroke, running from 100 to 1,200 revolutions per minute and about 700 revolutions per minute at 18 miles per hour; motor may be variously geared, by changing sprockets, 3:1, 3⅔:1, 4⅛:1, 4 5-7:1; lubrication by separate cups on cylinders and splash in case; hammer break spark with magneto; governed spark advancer, if ordered; single float feed spraying carburetor; planetary transmission; two forward speeds and reverse; chain transmission (self oiling chain); 8 gallons water capacity; thermo-siphon circulation; 7 to 10 gallons gasoline capacity; steering by vertical lever. Special feature: One hand control of steering, change gear and motor.

WHITNEY AUTOMOBILE COMPANY.

Runabout—Specification: Two passengers; 1,000 pounds; running gear with reaches; standard tread; long wheel base; 28x2½ inch wood wheels; roller bearings; 6 horse power motor, single cylinder, 4¾x6 inches; 1,000 revolutions per minute; make and break ignition foot controlled; float and sight feed carburetor; friction clutch transmission; two speeds forward and reverse; chain drive; 5 to 20 miles per hour; direct drive on high gear; single lever gear control.

ELMORE MANUFACTURING COMPANY.

Tonneau, Seating Four—Specification: Weight, 1,450 pounds; reachless angle iron frame, with semi-elliptic springs; 77 inch wheel base; 56 inch tread; 30 inch wheels; 3 inch Dunlop detachable tires; roller bearings on rear axle, ball bearings in front; 10 actual horse power motor, with double vertical cylinders, of 4 inches bore and 4 inches stroke, running at 800 revolutions per minute normal speed; splash lubrication in engine, with grease cups on outside bearings; make and break ignition; engine control by throttle; float feed carburetor; planetary transmission; three forward speeds and one reverse; range of speed up to 30 miles per hour; drive to rear axle by 1¼ inch pitch roller chain; water and gasoline capacity for 150 miles; Brown & Sharpe gear pump for circulation; steering by wheel, worm and segment. Special feature: Elmore double cylinder two cycle motor gives the same number of impulses as double the number of cylinders in other types.

BARTHOL BRAZIER.

Tonneau Touring Car, Seating Six—Specification: Weight, 2,650 pounds; Panhard style running gear; 85 inch wheel base; 52 inch tread; 36 inch wood wheels; 4 inch Goodrich clincher tires; roller wheel bearings; 15 horse power double cylinder vertical motor, of 5 inches bore and 6 inches stroke, running at 800 revolutions per minute, located in front under a bonnet; splash engine lubrication, with automatically controlled supply; jump spark ignition, controlled by hand; single constant level carburetor; Brazier gear transmission; three forward speeds and reverse; range of speed up to 25 miles per hour; water tank capacity sufficient for 125 mile run; positive gear driven rotary circulating pump; gasoline tank capacity sufficient for 125 mile run; wheel steering. Special features: Chainless drive; solid back axle; direct drive on high gear; gears always in mesh and positive clutches; universal joint between engine and gear case; gear and engine case bottoms can be taken down when the mechanism is in motion; all controlling devices are grouped on steering column; safety sprag for hill climbing.

KENSINGTON AUTOMOBILE COMPANY.

Tonneau Accommodating Four, Five or Six Passengers and Weighing 1,750 Pounds—Specification: Tubular reinforced frame; 72 inch wheel base; 56 inch tread; 28 and 30 inch wheels; 3 and 3½ inch Dunlop tires; roller wheel bearings; 12 horse power, two cylinder vertical motor of 4 inches bore and 4¾ inches stroke, running at 1,400 revolutions per minute; engine lubrication by hand pump; jump spark, hand controlled; Longuemare carburetor; sliding gear transmission; three forward speeds and reverse; range of speed, 2½ to 37 miles per hour; bevel gear drive; 4 gallons 1 pint water capacity; rotary circulating pump driven direct from motor shaft; 8 gallons gasoline capacity; wheel steering. Special features: Flexible shaft instead of chain; low centre of gravity; copper radiator; all operating levers under steering wheel.

HAYNES-APPERSON COMPANY.

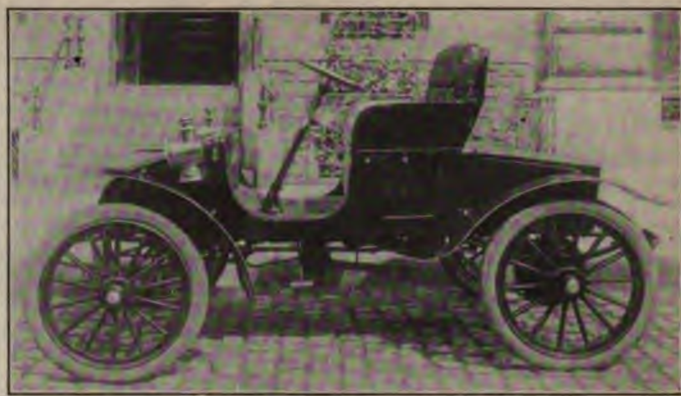
Runabout for Two — Specification: Weight, 1,300 pounds; running gear with steel tube reaches; 70 inch wheel base; 56 inch tread; 32 inch wood wheels; 3 inch clincher tires; roller axle bearings; 8 horse power double opposed cylinder horizontal motor of 4⅜ inches bore and 5 inches stroke, running at 900 revolutions per minute normal speed; lubrication by hydro-mechanical pump; ignition by make and break spark or jump spark timed from seat; spraying carburetors, one for each cylinder; separate clutch change gear; three speeds ahead and one reverse, all controlled by a single lever; range of speed up to 30 miles per hour; single chain drive to rear axle; 6 gallons water capacity; gear driven rotary circulating pump; 6 gallons gasoline capacity; wheel or lever steering.

Surrey Seating Four Passengers: Specification: Weight, 2,100 pounds; wheel base, 102 inches; tread, 56 inches; 36 inch wood wheels; 4 inch clincher tires; 12 horse power double opposed cylinder motor of 5 inches bore and 6 inches stroke, running at 750 revolutions per minute; 10 gallons water capacity; 9 gallons gasoline capacity.

MATHESON MOTOR CAR COMPANY, LTD.

Detachable Tonneau Car, Seating Four—Specification: Weight, about 2,000 pounds; running gear frame of U section pressed steel; 95 inch wheel base; 56 inch tread; 32 or 36 inch wheels; 3½ inch G & J clincher tires; ball wheel bearings; 25 horse power four cylinder vertical motor of 3⅞ inches bore and 4 inches stroke, running at 800 revolutions per minute normal speed; gravity engine lubrication; jump spark ignition; single carburetor of special design planetary transmission, giving either two or three forward speeds and one reverse; range of speed, 2 to 45 miles per hour; bevel gear drive; 2½ gallons water capacity; gear driven centrifugal circulating pump; 20 gallons gasoline capacity; irreversible wheel steering. Special features are

BERG 15 HORSE POWER TOURING CAR.



UNITED STATES LONG DISTANCE RUNABOUT.

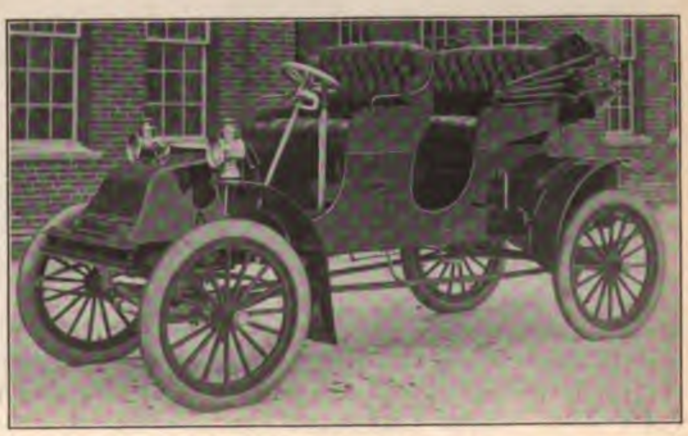
DURYEA PHAETON.

WHITNEY GASOLINE CARRIAGE.

10 HORSE POWER ELMORE TONNEAU.

BRAZIER TONNEAU.

KENSINGTON TOURING CAR.



HAYNES-APPERSON SURREY.

claimed to be embodied in the design of the cooler, carburetor and frame.

WINTON MOTOR CARRIAGE COMPANY.

Tonneau Touring Car—Specification: Double angle and sheet steel frame; solid forged front axle; ball bearings in front wheels; rear live axle with roller bearings; semi-elliptic springs; artillery wheels with clincher tires; 20 horse power double opposed cylinder horizontal motor; jump spark ignition with batteries (double set); gear transmission; chain drive; gravity, float regulated lubrication of engine bearings; splash lubrication of gear; radiator in front; positive gear driven, centrifugal circulating pump; transmission brake and rear wheel hub brakes; 11 to 12 gallons gasoline capacity (175 miles); wheel, irreversible steering comprising a worm and worm wheel sector.

HALL MOTOR CARRIAGE COMPANY.

Tonneau Touring Car—Described in The Horseless Age of November 19, 1902.

AUTOCAR COMPANY.

Tonneau Touring Car—Fully described in our issue of December 24 last.

F. B. STEARNS & CO.

Tonneau Touring Car—The specifications of this car were given in The Horseless Age of December 31, 1902. The motor is a double opposite cylinder one of 24 horse power. A cut of the vehicle is shown herewith.

THE PAN-AMERICAN MOTOR COMPANY.

The Pan-American Company will exhibit a regular touring car, a large six passenger vehicle and a chassis. The chassis will be the same in all three cases, the only difference being in the bodies. No changes from their regular standard, which was described in The Horseless Age of October 22, 1902.

CENTAUR MOTOR VEHICLE COMPANY.

The exhibit comprises electric runabouts, which were fully described and illustrated in The Horseless Age of January 14, 1903.

MOYEA AUTOMOBILE COMPANY.

Tonneau Touring Car—Specification: Wood lined steel frame, with semi-elliptic springs; 88 inch wheel base; 52 inch tread; 32 inch wood artillery wheels; 4 inch Goodrich clincher tires; ball axle bearings; four cylinder, 16 horse power vertical motor of 4 inches bore and 5½ inches stroke, located in front; jump spark ignition; shifting gear transmission; four speeds ahead and reverse; maximum speed, 45 miles per hour; gasoline capacity, 15 gallons; water capacity, 5 gallons; total weight, 1,900 pounds; lubrication automatic, supplemented by hand force pump; two outside band brakes and one inside brake on the differential, all double acting; wheel steering.

LOOMIS AUTOMOBILE COMPANY.

Tonneau Touring Car, Seating Four—Specification: Weight, 1,650 pounds; 84 inch wheel base; standard tread; 30 inch wood wheels; 3½ inch clincher tires; 12 horse power double cylinder, vertical motor in front, of 4½ inches bore and 4½ inches stroke; individual clutch transmission; three forward speeds and reverse; single chain drive; jump spark ignition without vibrator; wheel steering.

OLDS MOTOR WORKS.

The Olds Motor Works show one of their 1903 Oldsmobile runabouts, which differs little from their last year's model, except that it has a slightly longer wheel base and wood wheels instead of wire wheels. They also show a 10 horse power tonneau and an enclosed doctor's cab.

HOFFMAN AUTO AND MANUFACTURING COMPANY.

Detachable Tonneau Car, for Either Two or Four Passengers — Specification: Weight, 1,200 pounds; one part axles; 72 inch wheel base; 56½ inch tread; 28 inch wheels; Goodrich clincher tires; ball bearings on rear axle and roller bearings in front; 7½ horse power single cylinder horizontal motor, of 5 inches bore and 6 inches stroke, running at 750 revolutions per minute normal speed; splash engine lubrication; jump spark ignition; Longuemare carburetor; sliding gear transmission; three speeds; chain drive to rear axle; 5½ gallons water capacity; gear driven rotary circulating pump; 7½ gallons gasoline capacity; wheel steering. Special feature: Detachable tonneau body.

PACKARD MOTOR CAR COMPANY.

Tonneau with a Seating Capacity of Five, Weighing 2,200 Pounds—Specification: Reachless running gear; wheel base, 88 inches; tread, 56½ inches; 34 inch wheels; 4 inch clincher tires; ball wheel bearings; 12 horse power, single cylinder, horizontal motor of 6 inches bore and 6½ inches stroke, running at 850 revolutions per minute normal speed; gravity engine lubricator; splash lubrication for transmission; jump spark with automatic control; float feed spraying carburetor; sliding gear transmission; three forward speeds and reverse; range of speed up to 30 miles per hour; chain drive; 5 gallons gasoline capacity; gear circulating pump, driven by a universal joint attachment to the governor shaft; 12 gallons water capacity; wheel steering.

KIRK MANUFACTURING COMPANY.

Tonneau Touring Car—Specification: 30 inch wood wheels; 4 inch detachable tires; 10½ horse power double opposed cylinder engine, running up to 1,400 revolutions per minute; planetary transmission controlled by one lever; range of speed up to 30 miles per hour; rotary force pump for circulation; radiating coil in front; jump spark ignition, with one coil for both cylinders; mechanical feed carburetors; McCanna hydrostatic lubricator.

SIDNEY B. BOWMAN AUTO COMPANY.

The La France Tonneau Touring Car—Specification: Armored wood frame, supported on semi-elliptic springs; four cylinder 20 horse power vertical motor, located in front under a bonnet; both inlet and exhaust valves mechanically operated; jump spark ignition, with generator and accumulator; gear circulating pump; 36 inch wood artillery wheels; 15 gallons gasoline capacity; 8 gallons water capacity; irreversible wheel steering.

WARD LEONARD ELECTRIC COMPANY.

Model B 24 Touring Car—Specification: Armored wood frame, supported on semi-elliptic springs; 32 inch wood wheels; 3½ inch clincher tires; 80 inch wheel base; 51 inch tread; weight, 1,750 pounds; 16 horse power, two cylinder vertical motor, located in front; special change gear, giving four speeds ahead and one reverse, all controlled by a single lever; drive by shaft and bevel gear; jump spark ignition, thermo-siphon circulation; 12 gallons gasoline capacity; range of speed up to 35 miles; irreversible wheel steering; double acting differential brake and double acting rear hub brakes.

POPE-ROBINSON COMPANY.

Tonneau Touring Car—Specification: Weight, ready for the road, 3,000 pounds; passenger capacity, 6; reachless running gear; channel steel frame bars; semi-elliptic springs; 81 inch wheel base; standard tread; 34 inch wood artillery wheels; 4 inch detachable tires; plain bearings; 24 horse power four cylinder vertical motor of 4 inches bore and 6 inches stroke, running at 900 revolutions per minute normal speed, located under bonnet in front; contact ignition, hand controlled; storage battery and magneto for ignition current; Longuemare carburetor; sliding gear transmission; three forward speeds and reverse; drive by separate chains to rear wheels; gasoline capacity, 15 gallons; water capacity, 6 gallons; radiating coil in front; centrifugal circulating pump, chain driven; countershaft brake and rear wheel hub brakes; splash lubrication; irreversible wheel steering.

O. H. KEEP, JR.

The "F. I. A. T." is an Italian production and is being exhibited here for the first time. It is of the standard French motor in front type. The frame is of ash, braced with steel where necessary, but wood is used wherever possible, it being considered by the makers superior to steel for this purpose. Wheel steering is employed and is, of course, irreversible. Wheels are of wood. There are two levers, one for the speed changing gears and reverse and the other for the emergency brake. Lubrication is automatic, the feed being governed by the circulation of the cooling water, giving more oil as the speed of the motor accelerates and vice versa. The radiator, which is tubular, is in front of the bonnet, and the draught of air is augmented by a fan placed behind it. The current of air also materially assists in keeping the motor cool. The speed changing gear is peculiar to this machine and is said to be very satisfactory in use. There are three

Walter Tonneau.

Matheson Tonneau.

Winton Tonneau.

Stearns Tonneau.

Loomis Tonneau.

1903 Oldsmobile.

Hoffmann Tonneau.

Packard Touring Car.

"General" Runabout.

Toledo Gasoline Tonneau.

forward speeds and a reverse, the gears being always in mesh. The driving gears are solidly keyed to their shaft, while those on the countershaft, which is tubular, run idle when not in use. The speed changing lever is connected to a steel shaft, which is movable inside the tubular countershaft in the direction of its length. On this movable shaft recesses are turned corresponding in number and relative position to the gears on the countershaft. Each of the driven gears is provided with a pair of dogs, which are tripped by bringing the corresponding recess on the inner shaft into position, causing them to clutch the gear and countershaft together. The further movement of the shaft releases the dogs and allows the gear to run idle again. It is stated that any speed may be engaged without stopping at intervening gears.

The F. I. A. T. is made in 16, 20 and 30 horse power, all three models embodying the same general characteristics. Any style of body may be used. The 16 horse power vehicle complete with tonneau body weighs about 2,200 pounds. Fuel capacity, about 150 miles.

KNOX AUTOMOBILE COMPANY.

Combination Folding Front Seat Carriage, Seating Four Adults—Specifications: Weight, 1,600 pounds; side spring running gear and live rear axle; 72 inch wheel base; 54 inch tread; 30 inch wood wheels; 3½ inch detachable tires; Timken roller bearings; 8 horse power single cylinder, horizontal air cooled motor of 5 inches bore and 8 inches stroke, running at 600 revolutions per minute; mechanical engine lubrication; jump spark controlled by hand; float feed carburetor; planetary transmission; two forward speeds and one reverse; chain drive; 10 gallons gasoline capacity; side lever steering. Special feature: Grooved pin and forced air system of cooling the engine.

Knox Automobile.

GENERAL AUTO AND MANUFACTURING COMPANY.

Touring Car—Specification: Two inch tubular axles; semi-elliptic springs and forged steel hangers; roller axle bearings; 30 inch artillery wheels; 3½ inch tires; 14 horse power double cylinder vertical engine; mechanical lubricator; jump spark, automatically controlled; float feed spraying carburetor; shifting gear transmission; three forward speeds and reverse; range of speed up to 32 miles per hour; direct drive on high gear; drive by separate chain to each wheel; change gear operated by single lever; transmission brake and rear wheel hub brakes; friction clutch and brake mechanisms interconnected; engine provided with governor and accelerator; all oil supplied by mechanical lubricator.

INTERNATIONAL MOTOR CAR COMPANY.

Twenty-four Horse Power Touring Car, Seating Five—Specification: 94 inch wheel base; 54 inch tread; 34 inch wood wheels; 4 inch detachable tires; reachless running gear; 24 horse power four cylinder vertical motor of 4¼ inches bore and 5¼ inches stroke, running at 900 revolutions per minute normal speed; motor arranged in front; copper water jackets; jump spark ignition with belt driven dynamo and dry battery; sliding gear transmission; three speeds ahead and reverse; range of speed, up to 40 miles per hour; double chain drive; 1¼ inch roller chains; transmission brake and brake on rear wheel hubs; ball axle bearings; 16 gallons gasoline capacity; 5 gallons water capacity; chain driven gear circulating pump; new type radiator; lubrication by mechanical force feed, splash and compression grease cups; throttle governor; irreversible wheel steering.

Twelve Horse Power Gasoline Touring Car, Seating Five—Specification: Two cylinder vertical engine, 4¼x5¼, running at 900 revolutions per minute; jump spark ignition with current from dry battery; sliding gear transmission; three speeds forward and reverse; range of speed, up to 30 miles per hour; 30 inch wood wheels; 3½ inch detachable tires; ball axle bearings; 76 inch wheel base; 54 inch tread; 10 gallons gasoline capacity; 5½ gallons water capacity; chain driven gear pump; splash lubrication and sight feed and compression grease cups; irreversible wheel steering.

CLARK SINTZ.

Touring car, with 16 horse power, double cylinder vertical motor. Fully described in the last issue of The Horseless Age.

E. R. THOMAS MOTOR COMPANY.

Tonneau Touring Car (Model 18)—Specification: Frame of tapered steel beams with side plates of steel 3x¼ inches, reinforced with angle iron riveted to the side; 78 inch wheel base; 52½ inch tread; 8 horse power motor, with 1⅜ inch crank shaft and 140 pound flywheel of 18x3 inch rim; 32 inch front springs; 36 inch rear springs; forged spring clips; 1 inch pitch chain of one-half inch width and nine-sixteenths of an inch diameter of roller; roller and ball axle bearings; shifting gear transmission; three forward speeds and reverse; 25, 18 and 8 miles per hour; spark and throttle control arranged on steering column; double set of batteries; spark coil on dashboard; multiple oiler (on dashboard) for lubrication; new float feed carburetor; water circulation by pump; water and gasoline tank capacity for 200 miles; wood artillery wheels; front axle, tubular, of 2 inches diameter by No. 8 gauge; rear axle tubes 2¼ inches in diameter by No. 8 gauge; 3 inch Diamond detachable tires; Raymond double acting brake.

Thomas Auto-Bi, New Model, No. 35—Specification: Height of frame, 22½ inches; 28 inch wheels; 1¾ inch Goodrich tires; wheel base, 48½ inches; weight, 90 pounds; Thor hubs (specially constructed); heavy spokes; frame of Shelby seamless tubing, 1⅛ inch by No. 16 gauge; reinforced; 5½ inch head tube; forward extension seat post; Kirkpatrick hammock saddle; coiled spring truss fork; hygienic cushion spring frame; Thomas leather and steel belt; sight feed oiler; one lever control of throttle and exhaust lift; switch in left handle; 20 inch handle bars; 2½ horse power motor, with forged flywheels, hardened and ground bearings; lapped cylinders and three piston rings; Splitdorf induction coil; corrugated engine pulley, with oil receiver; V shaped steel rear

Covert Chainless.

Locomobile Limousine.

pulley; ball bearing idler; gasoline capacity for 200 miles.

B. V. COVERT & CO.

Single Seated Runabout—Specification: Weight, 625 pounds; tubular reachless running gear; 62 inch wheel base; 48 inch tread; 27 inch wire wheels; 2½ inch Dunlop tires; ball wheel bearings; single cylinder vertical 4¼ horse power motor of 3¾ inches bore and 4¼ inches stroke, running at 1,200 revolutions per minute normal speed; splash engine lubrication; jump spark ignition with hand control; Longuemare carburetor; sliding gear transmission; two speeds ahead and one reverse; bevel gear drive; 4 gallons water capacity; thermo-siphon circulation; 6 gallons gasoline capacity; wheel steering. Special feature: Brake and clutch combined.

LOCOMOBILE COMPANY OF AMERICA.

Gasoline Touring Car—Specification: Armored wood frame; wood wheels; 16 horse power four cylinder vertical motor in front, of 4 inches bore and 5 inches stroke; running at 900 revolutions per minute normal speed; jump spark ignition controlled by hand; throttle governor; single float feed carburetor; ignition current furnished by storage battery and dynamo, with automatic change over controlled by engine speed; sliding gear transmission; three speeds ahead and reverse; direct drive on the high gear; separate chain drive; brake on countershaft and rear hub brakes; water circulation by gear driven centrifugal pump; circulation gauge on dashboard; weight of tonneau touring car, 2,100 pounds.

J. D. STEVENS ARMS AND TOOL COMPANY.

Special Two Passenger Carriage, with Collapsible Front Seat for Two—Specification: Weight, 1,050 pounds; tubular running gear; 69 inch wheel base; 54 inch tread; 28 inch wheels; 3 inch double tube tires; 7 horse power, double opposed cylinder horizontal motor of 4¾ inches bore and 4½ inches stroke, running at 600 revolutions per minute normal speed; multiple oiler lubrication; jump spark controlled by hand; single float feed carburetor; individual friction clutch transmission; three forward speeds and reverse; range of speed, 5 to 30 miles; chain transmission; 5 gallons water capacity; spur gear circulating pump positively driven; 6 gallons gasoline capacity; steering by one spoke of a wheel. Special features: Motor started from seat; absence of noise and vibration and impossibility of a back kick.

CREST MANUFACTURING COMPANY.

Crest Mobile Runabout Seating Two Persons—Specification: Weight, 750 pounds; tubular steel running gear with three point support; wheel base, 72 inches; tread, 45 inches; 28 inch wheels; 2½ inch Diamond tires; ball wheel bearings; 5 horse power, single cylinder, vertical, air cooled motor of 1,500 revolutions per minute normal speed; splash lubrication; jump spark; Crest gear transmission running in oil; two speeds forward and reverse; range of speed, 2 to 30 miles per hour; shaft and bevel gear drive; gasoline capacity, 3½ gallons; lever steering. Special features: Air cooling, shaft drive and location of motor and gearing on the frame.

The Automobile Problem.

Prof. Frederick R. Hutton, Ph. D., dean of faculty of applied science, Columbia University, delivered a lecture on January 13 on "The Automobile Problem," under the auspices of the departments of electricity and physics of the Brooklyn Institute and the Polytechnic Engineering Society, Brooklyn, New York. Professor Hutton discussed the automobile as a motor, not as a carriage, and said that there were two classes to be considered, the storage system and the generating system. The storage machine he thought suitable for the city, on asphalt roads, for professional men and for women. With the generating class of motors, he said, it is more possible to go over the parts of country where one wishes to travel, though to be sure it takes a man who is something of a mechanic to run it.

STEAM VEHICLES.

MOBILE COMPANY OF AMERICA.

Heavy Steam Surrey, Carrying Six Passengers and Weighing 2,310 Pounds with Tanks Filled—Specification: Double cylinder 12 horse power engine, of 3⅛ inches bore and 4 inches stroke, running at 300 revolutions per minute; boiler, 17½ inches diameter by 14¾ inches height, holding 9½ gallons; special steel tip Bunsen burner; gasoline fuel; transmission ratio 2 2-3 to 1; 78 inch wheel base; 56 inch tread; 30 inch wheels; 4 inch tires (International); ball wheel bearings; double acting band brakes; chain drive; centre lever steering; 36 gallons water capacity; 16 gallons gasoline capacity; automatic devices: water regulator, low water alarm and fuel regulator.

Standard Runabout — Specification: Weight, 1,000 pounds (tanks filled); 4½ horse power; two cylinder engines of 2½ inches bore and 3¾ inches stroke, running at 300 revolutions per minute; 14 inch boiler; speed reduction, 3.1; wheel base, 53 inches; tread, 47 inches; 28 inch wheels; 2½ inch tires (Hartford); 6½ gallons gasoline capacity; 26¼ gallons water capacity; side lever steering.

INTERNATIONAL MOTOR CAR COMPANY.

Steam Carriage, with Detachable Dos-a-Dos Seat, for Four Passengers—Specification: Weight, 1,300 pounds; 7½ horse power two cylinder engine, of 3 inches bore and 4 inches stroke, running at 360 revolutions per minute; piston valves with rings; boiler, 19 inches in diameter, 18 inches deep; boiler capacity, 8 gallons; fuel, kerosene or gasoline at option; gear reduction, 2½ to 1; 76 inch wheel base; 54 inch tread; 30 inch wood wheels; 3 inch detachable tires; ball axle bearings; double differential brake; 1 inch pitch chain; side lever steering; fuel capacity, 9 gallons; water capacity, 15 gallons; mileage, 20 miles on one charge of water, 75 on one charge of fuel.

Mobile Heavy Surrey.

Prescott Victoria Top.

Toledo Steam Carriage.

Grout Tonneau.

PRESCOTT AUTO AND MANUFACTURING COMPANY.

Victoria Top Steam Carriage, with Collapsible Front Seat — Specification: Weight, empty, 1,050 pounds; tubular steel running gear; 68 inch wheel base; 54 inch tread; 28 inch suspension wheels; 2½ inch single tube tires; two cylinder vertical engine of 2½ inches bore and 3½ inches stroke; 16 inch fire tube boiler, with superheating device; special form of burner; chain drive; 10 gallons gasoline capacity; 32 gallons water capacity; steam air pump and steam boiler feed pump, in addition to the usual pumps; American roller bearings on rear axle; ball bearings in front; double acting brakes on wheel hubs.

WHITE SEWING MACHINE COMPANY.

Tonneau Touring Car—Specification: Seating capacity, four; weight (tanks filled), 1,650 pounds; 80 inch wheel base; 56 inch tread; 30 inch artillery wheels; 4 inch Goodrich clincher tires; semi-flash, non-explosible steam generator; 10 horse power compound enclosed engine; two independent sets of brakes; gasoline capacity, 10 gallons; water capacity, 15 gallons; condenser; aluminum body and guards; extreme length, 10 feet; extreme width, 5 feet. Special features: Automatic fuel and water feed; absence of water glasses; steam generator will not scorch or burn; long range on one charge of supplies; no visible exhaust; chainless drive.

White Touring Car.

GROUT BROTHERS.

Tonneau, Seating Four—Specification: Weight, 2,000 pounds; angle iron running gear frame; 84 inch wheel base; 56 inch tread; 32 inch wheels; 4 inch Diamond clincher tires; plain axle bearings; 12 horse power two cylinder engine, of 3¼ inches bore and 4½ inches stroke; 20 inch steel boiler; three feed water pumps, one of which is a steam pump; one steam air pump; 15 gallons gasoline capacity; 53 gallons water capacity; 100 miles on one tank of water with condenser; speed, up to 50 miles; wheel and lever steering.

LOCOMOBILE COMPANY OF AMERICA.

The steam exhibit of the Locomobile Company includes a runabout which has

the following specifications: Sixteen inch boiler; Klinger gauge; generator and pilot light; 2½x3½ locomobile engine encased and using superheated steam; Octopus lubricator; steam water and air pumps; 14 gallons gasoline capacity; 30 gallons of water capacity; 28 inch heavy steel wheels; 2½ inch tires; roller bearings on rear axle; automatic cylinder oil pump.

Other locomobile steam models for 1903 include a stanhope, a dos-a-dos, a surrey and a tonneau.

ELECTRIC VEHICLES.

STUDEBAKER BROTHERS MANUFACTURING COMPANY.

The exhibit consists of the following electric vehicles: One spindle seat runabout with wire wheels, one panel seat runabout with wooden wheels and buggy top, one Stanhope with wooden wheels and one Stanhope with closed top and wooden wheels. All of the three models mentioned have gears of similar design and construction, comprising an under frame of tubular steel. The motor is hung on this frame slightly to the rear of the centre. The batteries are carried in a compartment at the rear of the body. The drive to the rear live axle is by chain.

The battery is composed of twenty-four Exide cells, which are said to give a mileage on one charge of 40 miles over average streets. The weight of each of these vehicles is 1,350 pounds, of which the battery weight represents 570 pounds.

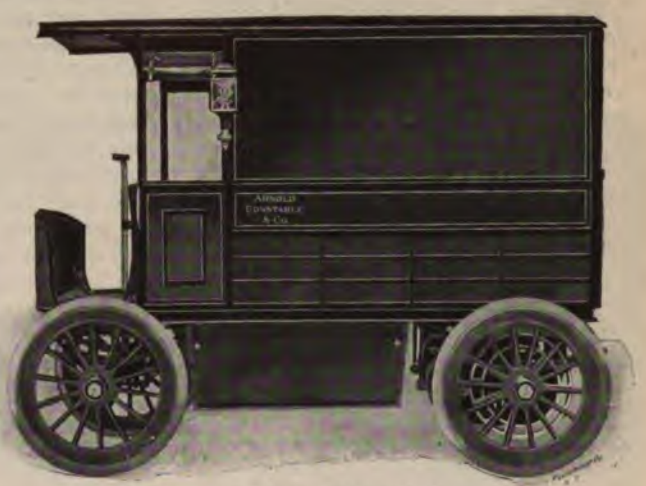
The controller gives four speeds of 3, 6, 9 and 13 miles per hour. It is claimed that any ordinary grades present no obstacles. Each vehicle is provided with two brakes, which are entirely independent of each other. The special features claimed are side steering, half elliptic front springs and complete accessibility of all running parts. Detachable pneumatic tires are supplied as a standard, but single tube tires will be furnished to order.

ELECTRIC VEHICLE COMPANY.

The exhibit of electric vehicles by the Electric Vehicle Company comprises two broughams, one hansom, an inside operated electric coupe, an electric rear boot coupe, a runabout, a cabriolet, two victorias, one tonneau, one special service wagon, and one electric truck.

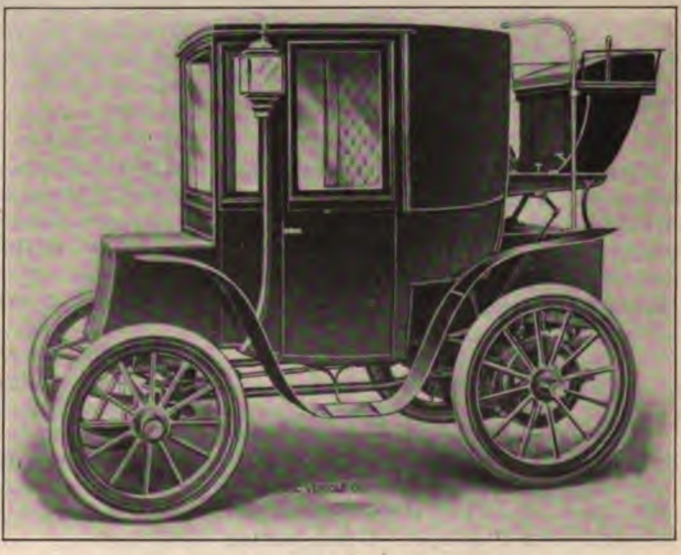
The rear boot coupe herewith illustrated is described as follows: The passenger compartment regularly accommodates two persons. Additional seating capacity is afforded by a hinged seat forward, facing the main seat, which may be lowered and brought into service. The location of the operator at the rear leaves the forward view from the compartment entirely unobstructed—a feature which makes the vehicle an especially convenient one for sightseeing or for pleasure driving at times when the use of an open carriage might be undesirable. The upholstery in claret colored broadcloth, silk curtains, electric light in dome fixture, memorandum case and other conveniences are features of the interior furnishing. A foot warmer can be supplied for winter use. The weight of the battery is distributed over both axles and the battery compartments have removable top coverings. There are foot operated regular and emergency brakes of improved pattern and a foot operated emergency switch. The motors give three speeds for-

BAKER CARRIAGE.



VEHICLE EQUIPMENT COMPANY.

STUDEBAKER ELECTRIC RUNABOUT.



COLUMBIA REAR DRIVEN COUPE.

ward and three backward, with a maximum of 14½ miles per hour.

THE VEHICLE EQUIPMENT COMPANY.

This company exhibits various electric delivery wagons, trucks, broughams, victorias, etc. The trucks and wagons are built to order, having a radius from 30 to 35 miles on one charge of battery and a speed of from 6 to to 12 miles per hour. They are now in use by a considerable number of leading New York houses, including Tiffany & Co., Arnold, Constable & Co., W. & J. Sloane, James A. Hearn & Co., Rothenberg Company, Singer Sewing Machine Company, George Ehret Brewery, etc. The broughams, victorias and hansoms run 40 miles on one charge and have a speed of 14 miles per hour.

INTERNATIONAL MOTOR CAR COMPANY.

Waverley Electric Runabout—Specification: Reachless running gear; full elliptic springs; 61 inch wheel base; 54 inches tread; 30 inch wire or wood wheels; 2½ inch G & J detachable tires; 3 horse

NATIONAL MOTOR VEHICLE COMPANY.

power motor, capable of 100 per cent. overload; drive by herringbone gear, running in oil; combination volt and ammeter; foot brake and electric brake; 24 cell battery; speeds, 5 to 15 miles per hour.

AJAX MOTOR VEHICLE COMPANY.

Two Passenger Electric Runabout—Specification: Weight, 1,050 pounds; tubular truss front and rear axles; 60 inch wheel base; 48 inch tread; 28 inch wheels; 2½ inch tires; ball wheel bearings, (one-half inch); horse power of motor, 1½ to 6.

An Imitation Celluloid.

A useful imitation celluloid is produced, according to a German method, by dissolving in 16 parts by weight of glacial acetic acid, 1.8 part of nitro-cellulose, and adding 5 parts of gelatine. Gentle heating and stirring are necessary. After the mass has swelled, it is mixed with 7.5 parts of 96 per cent. alcohol, with continued stirring. The syrup produced is poured into molds, or, after further dilution, may be spread in thin layers on glass. As an underlay for sensitive photographic films the material has important advantages, not the least being that it remains flat in developing.—*Mechanical Engineer.*

The Use of the Automobile as Conveyance on a Hunting Trip.

By Dr. Henry A. Baker.

My friend K——, who is a champion rifle shot, and I (also very fond of the sport) have for the past four years taken our vacations together. In August we go to some country town and amuse ourselves by shooting woodchucks where they are plentiful. It has been our custom on such trips to hire a horse and carriage at the local stable, drive out into the farming districts and capture the rodents. We had often said, while on these trips, what an ideal conveyance an automobile would be for the purpose, as it would stand perfectly still and not bolt at each shot, as horses do. But we surely did not imagine that we should be able to realize our ideal so soon.

Last August, when our vacation time came around, I told my friend that we could take our abode in the air castle we had built, and if agreeable to him we would make the trial. So we decided to take a two weeks' trip. In talking the matter over we came to the conclusion that great speed and covering a great distance each day would be the least of our objects, as we were going for pleasure entirely. We also thought of the country horse as being our greatest terror, and made an iron clad rule that when we got into the country we would stop for every horse we met, whether frightened or not, get to the side of the road as far as possible, shut off the fire and stand absolutely still until the horses were safely past us. By so doing we felt assured that no blame could be attached to us in case a horse should take fright.

THE START.

So, after having a dress suit case rack built for my carriage, and procuring a dress suit case to strap onto the front seat, on Saturday morning, August 16, with bag and baggage packed up and rifle and rain coats on the seat beside us, we left West Roxbury, Mass., at 9:20, via the Newtons, Watertown, through Waltham to Concord. We arrived at Groton at 12:30, where we took lunch. After thoroughly oiling up we left at 2:15, passing through Townsend to New Ipswich, N. H. Our water was getting low, and when we came to a stream far below a bridge, over whch we passed, we found the ejector hose would just reach the water by an inch to spare. We took in water without difficulty and went on our way, passing through Jeffrey Village, where we struck the mountain roads. It had been my custom to have the water pump fill the boiler when coasting down hill and by-passing when going up, but these hills were so steep and long that I found it necessary to supply the boiler while ascending, and we sailed on up, up, up. I found I was not holding my water level and was in hopes soon to reach the top, that I might regain it, but instead of that it was up, up, with the water in the boiler lowering all the while. It got so low I could only catch a glimpse of it as we passed over the water courses o road. However, we reached the t safety and began to descend, when gained my water supply. As we we scending this hill we passed a heavy line car, which was stalled on the roa being repaired.

Passing over a spur of Mona Mountain, an outlying portion o township of Dublin (a fashionable su resort), we met many fancy turnout greater part driven by ladies, an thing which struck us as peculiar wa city horses, which were undoubted customed to automobiles, should sh much fright in the country. But ad to our rule, and sometimes leadin horse past our carriage, we received pleasant "Thank you's." Passing th Marlborough, we arrived at the Ch House, Keene, N. H., at 6:45, after pleasant day's trip. Our odometer tered 88 miles, and we had had n haps, save

BREAKING THREE SPOKES.

August 17, being Sunday, we spen a college chum of mine. Monday, th being a rainy day we did not atte mote, but went about the town try find spokes to fit my carriage. Not been able to find them by 4 o'clock, phoned to the factory for a dozen, r ing them to affix a special delivery to hasten their arrival. As a resul were in Keene by 10 o'clock that nig when we came down to breakfast t lowing morning they were awaiting the hotel office. After breakfast I s up and took the machine to the loca mobile factory to have the spokes It was necessary to remove the rear to get the spokes in, for which they c me $1. By keeping the man well s with cigars I learned many valuabl from a very ingenious mechanic.

As our trip was not laid out, we r to go to a place from day to day as inclined. It began to clear up a o'clock, and learning from my colleg that there was a very good hotel a pole, kept by a man whom I knew, cided to make the trip that night. Keene at about 5 o'clock, and as s we got out of the city limits we fo roads very muddy and somewhat But we kept on at a good, comforta arriving at Walpole, by the way o Moreland depot, at 7 o'clock; dista miles. The hotel proprietor was ve to see us, and was sorry that he co give us the best of rooms, as it wa Home Week," and the best room taken. However, we succeeded in two adjoining rooms. While blow steam we were told that supper was At the table I asked my friend K he was hungry. He replied: "Not but from the way he disposed of h large chicken I came to the conclusi automobiling was

A VERY HEALTHFUL PASTIME.

Wednesday it rained, and we sp time about the hotel and with some

ing on the machine. Thursday it was a cloudy morning, clearing about 10 o'clock. After the grass was dry we took out our rifles and went on foot after chucks. After strolling about 5 miles, seeing several but capturing none, we returned to dinner. After dinner we steamed up, started out and took our first hunting trip with the auto. After going 5 or 6 miles my friend lost his pipe stem, which we found after a fifteen or twenty minutes hunt. We soon came to a field where the chucks were quite plentiful, and shooting three or four, then going up a long hill, a woman appeared, somewhat excited apparently at the puffing of our machine, and informed us that she had a friend and horse at the brow of the hill. We moved out at one side of the road, into the bushes, and my friend led the horse by without difficulty. Reaching the top of the hill we came to another field full of chucks and shot quite a number. Several teams passed us each way, but had no trouble. Going over some bad, sandy roads we came to a farmer's house, where the man had a pair of spirited gray horses in his yard, not hitched to any vehicle. As they showed signs of much fear, we stopped, and he drove the horses about our carriage to get them accustomed to it. We asked permission to go out into his field to shoot some chucks, which he granted.

FARMER LOSES A LAMB.

So we took the machine around to the end of the house and left it on the lawn, about 20 feet from the road. After shooting several chucks we saw a boy running toward us. Thinking that we were to be ordered off, we approached him. He told us that our automobile had created a good deal of disturbance. It seems that after we had left the farmer had hitched up one of the horses to a buggy and driven around to the side of the house, where our machine was standing, and the horse had wheeled with him, tipped him out and run to the barn. I understood him to say a man's leg had been broken; but further conversation developed that it was only a lamb's leg, and my mind was more at ease. Upon reaching the house and getting ready to start the farmer appeared again with his horse, equipped with a curb bit. He spent considerable time driving about the machine, which delayed us; but we did not complain. He thought we ought to pay for the loss of the lamb, as he was a poor man. We told him if we were in any way to blame we would do so, but that he would not admit. We inquired if we could return to the hotel by another road. He informed us that we could cross the ferry below his house, and return on the other side of the Connecticut River.

As we approached the ferry the boat was coming our way, with a horse and carriage as occupants. So we steamed out some little distance from the shore, so as to allow the team to pass, and hailed the ferryman, asking if he would take an automobile across. He consented, and we went aboard. The approach to the boat was very steep, but we got aboard without any difficulty. As we approached the other shore I noticed it was even steeper than the one we had left, and very sandy. It was quite a problem to me how to leave the boat and reach the main road in safety. If I could not make the bank to the main road the prospects were I would run backward into the river. The ferryman having an assistant, I requested them to step in behind the machine, as soon as I had passed them, and push for all they were worth. Here quite

A LAUGHABLE SCENE

took place, for I had on a good head of steam and shot off the boat like a bullet out of a gun, and in their attempt to assist me I left them both sprawling behind in the sand.

We reached the hotel at just dark that evening. We planned to make White River Junction, Vt., on Friday. After getting steam up we received a telephone message from my friend in Keene, saying he would arrive about 9 o'clock in the morning by train. This was going to cause a delay that we did not relish. However, we met him and his son at the station, and took them to the hotel. After taking him around to make several calls we got away at 10:15. The roads were in fair condition until we reached Bellows Falls, Vt., where we stopped to take photographs, and here there were signs of a heavy shower that had fallen, as the roads farther along were flooded. As we wished to reach Charlestown, N. H., for dinner we ploughed through the mud, and arrived at 11:45.

About 3 or 4 miles before reaching the town I noticed my gasoline pressure suddenly go down. On geting out and investigating I found my

GASOLINE PUMP PLUNGER

apparently broken. I said to my friend: "I guess we are in for it," but told him we would pump up the gasoline pressure by hand, and repeat the pumping from time to time as required. After pumping up the pressure we started, and to my surprise it kept up, and we made the town as before stated. While friend K. went to order the dinner I set to work to see what could be done about my pump plunger. On closer investigation I found it had simply unscrewed, and the reason of the pressure being kept up was that the thread in the receiver had caught on to the thread of the plunger sufficiently to work it. Screwing it in tightly, it was as good as ever.

As it began to rain I put the carriage under the shed and went to dinner. After the shower had passed I took in water at the trough in the square. Charlestown was the home of Charles Hoyt, the playwriter, and my friend had taken a photograph of his residence while I was taking in water. We left Charlestown at 1:43, amid the cheers of the crowd, it being Old Home Week here, en route to Claremont, where we took in gasoline, and had considerable trouble in obtaining the 76° grade, which caused a delay of one hour. From there we proceeded to Windsor,

EN ROUTE.

WOODSTOCK, VT.

Lebanon, N. H.

Lake Mascoma, N. H.

Vt. The river road was very muddy, the wheels sinking in half way to the hubs in some places, thus making progress slow. We therefore took the hill road, which we found free from mud, but quite hilly and very narrow. We arrived at White River Junction at 7 p. m., the odometer registering 55 miles.

Saturday, August 25, when we went to the stable to fire up our machine we found it very dirty, and decided to give it a bath, for which we engaged the washer of the stable. After getting the machine washed and fired up we left White River Junction, about 11 o'clock, for Dewey's Mills, climbing hills continuously for about 10 miles, stopping with a friend of mine who is very much interested and

DESIROUS OF OWNING AN AUTOMOBILE,

but is hesitating on acount of fear of frightening horses. We thought perhaps our visit and experience might be an encouragement to him. He invited us to dinner, after which I spent considerable time in taking his family around the town. In the vicinity of White River Junction we noticed that horses paid little or no attention to our machine, probably because it is a great railroad centre. After visiting the celebrated Queechee Gulf at Dewey's Mills, at 4 o'clock we left Mr. Dewey, regretting very much that he did not own an automobile, but as he is kin to Admiral Dewey we felt he should have sufficient courage to make the test.

Shooting a few chucks on the way, we arrived at the Woodstock Inn, Woodstock, at 5 p. m. The distance from White River Junction, including what running around we did, made 22 miles. There is a little amusing incident in connection with Woodstock that I wish to relate.

AN ANTI-AUTOIST CONVERTED.

One day last summer while at my club I met a friend, a resident of Woodstock. The subject of automobiles came up in the course of conversation and I told how much I enjoyed mine, and how very practical it was. I found him very much prejudiced against them; he went so far as to say that if automobiles became plentiful in that section it would very much injure their business; the farmers would not dare to come to the town to do their trading, on account of their horses being afraid of them. But I learned that he himself had a horse which was afraid of automobiles, so it sifted down to selfish motives. I told him that some bright day he might see me steaming into town. His reply was that I would not be welcome.

This friend's brother is proprietor of the inn at this place, and when we arrived I told friend K. that I had better go in and investigate to see if we would be refused shelter. "I am here with a friend and an automobile; can you accommodate us?" Whereupon he telephoned to the stable that Dr. Baker was there with his automobile. "Can you put him up?" I knew the stable keeper well, and he answered: "Tell him to take it right around; I will take care of him," which I did, and got a good place in the stable, too.

During the evening my anti-automobile friend came to the hotel. I reminded him of what he said to me in Boston. His reply was: "I will take it all back, doctor; I am real glad to see you." During the evening I called on many of my acquaintances, and found that they were not at all so much opposed to the auto as I supposed.

The next morning, being Sunday, we did not hurry about gettting away; had machine washed at the stable, hunted up a friend who owned an auto, had my gasoline tank filled, and left Woodstock at 12:30, by way of Barnard and East Barnard. I was familiar with the roads in that vicinity, and knew we would soon come to a steep hill by the Gulf road. We kept up a good supply of steam and made the hill with ease. Reaching Barnard we took lunch. Here we found horses which showed the most fear of any on our trip, as we were far into the rural district, 10 miles from the railroad. Consequently we had to use more care, not only stopping but getting out when meeting horses, throwing our rain coats over portions of the carriage and walking back and forth, one of us assisting in leading the horses by. This we found to work better than any method we had pursued, except in one instance, where a young fellow had his best girl out for a Sunday ride. He told us not to bother to get out, but to come on. He wanted to see if his horse would be afraid. I informed him we would do nothing of the kind; his horse would be afraid, all right, and my advice to him was to get out and lead him past before he got nervous. His girl, who evidently was wiser than he, said: "Why don't you do as the gentleman tells you? You know you can't hold the horse if he gets nervous." But the young man, thinking he knew it all, insisted upon driving past, with the result that the horse bolted clear out of the road, and ran at top speed with the carriage over stones and stumps, most of the time on two wheels. Looking back we saw them coming into the road all right, but to this day it has been a mystery to me why they did not capsize.

A HILLY DISTRICT.

After leaving Barnard Village we struck some of the steepest hills I ever undertook to climb. This would be an ideal spot for a hill climbing contest. I asked friend K. to get a good sized stone to trig the wheels in case the drive chain should break, and here I would have felt safer with a chainless drive. We reached the summit in safety, and it seemed as if we were up in the clouds. We met two farmers with a horse, and they wanted to know what newfandangled thing we had. "A new seed sowing machine?" Our reply was "No. Look out for your horse," which began to bolt and try to run, but was so clumsy that he fell down flat in the attempt, and as he picked himself up the fright was all taken out of him, and he walked past as gently as a lamb. We now began to descend the hill, which was so steep and long that we had to use not only the brake but reverse the engine to hold the machine from

getting away from us. We arrived at South Royalton at 3:30; distance, 24 miles.

On August 25 we left at 9:13 on a hunting trip for Bethel and Randolph. After passing Bethel we came to where they were

REPAIRING A ROAD,

which was all torn up and dug down about 3 feet and filled in with large rocks for about 100 yards. As there was a deep ditch on either side it seemed to me impossible to pass. I got very indignant at such methods of road building, particularly as it commenced to rain; to quote my friend, who kept the notes: "This is where the doctor got redheaded." I informed the workmen that they must do something to let us pass; so they took shovels and hoe and leveled down the dirt which they had heaped up on one side; but, I assure you, it was no boulevard road then. However, we passed over it, not knowing whether the differential was dragging in the dirt or not, but finding upon getting across that it had not. It was not a pleasant prospect to ride on a dirt heap, with a ditch 4 feet deep on one side and about the same on the other, filled with rocks, with only just room enough for the carriage to pass. Had we varied our course by 4 inches either way we would have fallen into one of the ditches, and with the inequality of the surface it was no easy matter to pass over.

We reached Randolph at noon and dined at the Red Lion Inn, after which we called upon a friend, to find out where I could procure gasoline. While filling a terrific shower came up. Taking the machine back to the stable, we waited until it was over. After getting ready to start the natives began to crowd around the machine. I inquired how many inhabitants there were in the town, and after my friend had told me the number I said that that was my estimate on the supposition that they were all there. After going a few miles it began to rain and the chucks began to come out. After shooting a few it began to pour in good earnest, and we thought it wise to get in out of the wet, so we made for a farm house and got in under a shed until it cleared. This resulted in a muddy run to the hotel, at which we arrived before dark; distance, 31.4 miles.

On August 26, on taking the machine out of the stable, we found a tack in the front off wheel and the tire flat, which I repaired in a few minutes. My hand tire pump was not working well, so I took it to a jeweler and had it fixed. It being so near the noon hour we decided to stay until after dinner, and left at 1:30 for White River Junction, taking several photographs on the way. As the roads were in rather bad condition 12 miles an hour was about as fast as we could go with comfort. Arrived at White River Junction at 3:20.

We had the machine washed, and left at 5:16, arriving at Lebanon, N. H., at 6 p. m.; distance, 26.6 miles for the afternoon. On August 27 we left Lebanon at 10:10 for Enfield and Mascoma Lake. We dined at the Lakeview House, and

CALLED ON A FRIEND

from Boston, who has a cottage at the lake and goes back and forth in his auto. Not seeing any stir about the cottage, I tooted my horn. My friend appeared immediately, and said, "I told my wife that was Doctor Baker's horn," but he was much surprised to find that I was really there.

We left Mascoma Lake at 2 p. m., passing through Enfield Centre to Springfield, where we ploughed through 8 miles of continuous sand. As it was a swampy district, sand was the only material they could get nearby for road building. We passed through Grantham to Croydon, which town I used to live in when quite small. Talking with an old inhabitant and inquiring about friends of my boyhood days, I found that many of them had gone to the other world, where golden chariots are used instead of autos. Meantime K. was photographing different views, including the little red schoolhouse where I used to go. Passing down the valley road, beside the north branch of the Sugar River, which road I had trudged to and from this little school, it was with no little pleasure, as I rode along, that I thought of the fishing up and down this stream with a bent pin for a hook. Reaching Croydon Flats I saw a familiar face, and turning my machine round to the store door, that I might speak to him, pop! goes my water glass. After a few minutes to replace my glass we steamed off. The remainder of the trip for that day was over what I knew to be very sandy roads. But when we came to the worst part of it sand was far from my mind, I suppose for the reason we met a gray horse which we had considerable trouble in passing. As most of our trouble had been with gray horses it became a byword. Every time we saw a team coming one or the other would say, "Is it a gray horse?" It did seem to be a fact that they were more frightened than those of other colors. We arrived at Newport, N. H., at 7:20; distance, 38 miles.

It may seem to the reader that we were making slow progress on our trip, but we stopped to take photographs every few miles besides stopping for every horse, and showing the courtesy we did, the natives, as soon as safely passed, would want to stop and talk the matter over. Besides, we were going over some of the worst roads for making speed that I had ever had any experience with. Going through a section where I was well acquainted we made many calls and did not attempt to go any faster than compatible with the greatest comfort to ourselves.

BURNER CLEANED.

On August 28 we left Newport House for Sunapee Lake by the way of Rider Corners, and going over one of those country roads where the grass grows up in the centre, we had a chance to sweep the bottom of our carriage, as the grass was two feet high. On striking the main road again, I had considerable difficulty in keeping up steam, for lack of fire.

SUNAPEE HARBOR, N. H.

SUNAPEE LAKE, N. H.

Sunapee being a manufacturing town, I took the machine to a machine shop and employed a machinist to take off the burner, that I might get at the vaporizer, to clean it out, after which I had him put it back. Taking the burner off and replacing it took him the best part of an hour. Lying on his back in the dirt he got his hands and face so completely covered with black grease from the chain that one could hardly recognize him. After getting ready to start I said, "Well, my man, what is your charge?" His reply was to the effect that as I had done most of the important work he would charge me a quarter. This reminded me of the Irishman who wrote to his brother in the old country telling him what a fine job he had in this country—that all he had to do was to carry bricks and mortar up a ladder to the top of a high building, and a man up there did all the work.

HIGH GASOLINE PRICES.

Lunching at the Ben Mere Inn, we left Sunapee Harbor at 5 P. M. for Bradford, by way of West Newbury. At the station there was a large crowd, and on inquiring we were informed that a train bearing the President was expected. After leaving Newbury we met a procession of teams coming from another direction, having been to Bradford to see the President. Passing this procession with safety, but rather slowly, we arrived at Bradford at 6:30. After supper K. and I took a stroll in pursuit of gasoline. They asked all the way from forty to eighty cents per gallon, and we did not take in a supply.

On August 29 we left Bradford for Hillsboro Bridge by way of Henniker. We were steaming along, enjoying the solace of our pipes, when we saw a man approaching us with a pair of gray horses hitched to a dump cart. I said to K., "Look out for trouble—a pair of gray horses," and, sure enough, as soon as they observed us they commenced to bolt, and every effort on the part of the driver could not prevent their turning with him and running back to the house—cart and all. As we passed the horses were watching us from the barnyard, and the driver had anything but a pleasant expression. We were going through a beautiful piece of shady woods, and coming to a babbling brook, it looked so tempting that I followed it up to a spring. When I returned K. was chatting to a farmer on the opposite side, and a nice little blaze rose from the body of the carriage. I blew out the vaporizer. K. remarked that he thought he smelled varnish burning, but investigation showed no serious damage, only a blistering of the paint on the side of the carriage, about the size of a dollar bill. This was caused by a slight leak in the vaporizer, allowing a little vapor to escape, and taking fire.

We reached Hillsboro Bridge at 10:30, called on some relatives, purchased gasoline and filled the water tanks. After dinner we started on our way at 2 o'clock. Reaching the outskirts of the town we inquired about the best road to Manchester. We were advised to take a road by the way of Goffstown, but we would find one continuous uphill road for 3 miles. After we had gone that distance we did not dispute the gentleman's veracity. My vaporizer beginning to clog again, I could not get sufficient steam to run to the best advantage, and we made rather slow progress on some of the hills. Among the many teams we met was a very swell turnout, a trap drawn by a pair of spirited horses, driven by a young woman, and I never saw better horsemanship displayed than by the way she managed those horses. As the roads were very narrow we were unable to get out very far to one side. We arrived at Manchester at 6:30; distance, 47.3 miles.

ANOTHER BURNER CLEANING.

On Saturday, August 30, we inquired at the hotel office if there was anyone in town who repaired automobiles. We were directed to a bicycle repair shop where they had made an automobile. There the burner was taken off to remove the vaporizer. It was necessary to have the vaporizer heated, to remove a twisted wire, to relieve the clogging. The charge was one dollar. After getting things put together again, we left the New Manchester House at 12:30, by way of Deering and Salem, N. H. Spent about an hour with a relative at Deering and arrived at Lawrence at 6 p. m.; distance, 27.8 miles. Spent the evening with a friend.

On Sunday, August 31, we left Lawrence at 11 a. m. for Boston, by way of Andover, Reading, Winchester, West Medford, Arlington, Somerville, Cambridge, to the Athletic Club, Boston. We arrived in West Roxbury at 2 o'clock, the trip for the day being 40 miles, and the grand total for the whole trip 501½ miles. Thus ended one of the pleasantest vacations we have ever spent together.

In conclusion would say if we had made the trip with a gasoline machine we undoubtedly would have had much more trouble with horses. We discovered that they were more afraid of the noise than the sight of the machine. When I first had the automobile fever I was more in doubt about its practicability for touring trips through the country than for city work, but in closing would say that we found it more practical for touring than I ever thought it possible.

At a second meeting of the legislative committee of the Massachusetts Automobile Club, Boston, Mass., and the representative of the motor vehicle manufacturers and agents, on December 23, many matters of interest to the users of automobiles were discussed at considerable length, and a plan of campaign was partially decided upon in reference to legislation affecting automobiles in the next Legislature.

...OUR... FOREIGN EXCHANGES

The post office authorities in Lo during the Christmas season made use White steam delivery vehicle.

The A. C. G. B and I. will hold its quarterly 100 mile trial on January 24 its annual meeting on February 27.

A committee of the Italian Parlia recommends the payment of subsidi public automobile omnibus services.

W. E. Moss has been appointed hon secretary of the Liverpool Self Pro Traffic Association, to succeed Shra Smith, who resigned recently.

According to M. Rives, the direct the late Paris automobile show, the number of paid admissions to the show ured up to 197,454. In previous year admissions were as follows: In 1898 400 visitors; 1899, 83,700; 1900, 8 1901, 130,600.

In the Tombola, in connection with Paris exhibition, the leading prize, a 6 power gasoline carriage, was drawn by 113,508, and a De Dion tricycle by 60,195. According to the rules the had to be claimed within twenty-four from the time of drawing, but an exte of the time to one week was allowe winners to claim their prizes.

The special prize (gold medal) do by the municipal council of Paris awarded to De Dion-Bouton & Co. medal of the Chambre Syndicale du et de l'Automobile to Panhard & Leva of the Chambre Syndicale de l'Autom to Darracq & Cie.; of the A. C. F. t Clement Co.; of the Syndicat des F cants de Cycles to the Gladiator Com

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The Society of Motor Manufacturer Traders held a meeting on Decemb last to discuss the light delivery van proposed. The following points wer proved of: The trials are to last for months; no manufacturer shall be all to have more than two vehicles in any and the judges are to be independen perts. A committee was appointed to rules representing the wishes of the so

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In the report of the commission app ed by the Paris municipal council t quire into the practicability of moto engines it is recommended to adopt a gine shown at the 1900 Universal Ex tion, which combines the advantage of speed with carrying aboard a suppl water with which it can begin to com fire the moment it arrives at the sce conflagration. A considerable savin cost is also anticipated.

BEGINNERS PAGE.

Accessories—Arrangement of Parts.

MUFFLER AND FEED WATER HEATER.

The exhaust from a steam engine of an automobile must be muffled to secure the very desirable noiseless operation, the same as the exhaust of gasoline engines. The muffling is effected by giving the exhaust steam a chance to expand in a closed chamber before escaping to the atmosphere, and to drop in pressure by coming in contact with cold objects. The heat which must be extracted from the steam to reduce its pressure may profitably be employed in heating the feed water before it passes into the boiler and in most steam carriages mufflers for the exhaust are combined with heaters for the feed water. This permits of raising the temperature of the feed water to near the boiling point before pumping the water into the boiler and enables the boiler to generate steam more rapidly and with greater economy of fuel. A form of combined muffler and feed water heater is shown in Fig. 1.

The device consists of a flat cylindrical box cast of aluminum in two parts. The space within the case is formed into a tortuous passage by partition walls A A A, which run only partly across the space, alternate walls leaving an opening at opposite ends. Within the case is arranged a coil of pipe B. The exhaust steam from the engine enters at C, passes through the tortuous passage referred to and leaves the case at D, from where it is led through a pipe to the rear of the carriage and there discharged to the atmosphere. The feed water enters the coil at E and passes out at F. It will readily be seen that the steam in passing through the tortuous passage comes in contact with every portion of the coiled water tube and the water is consequently raised to a high temperature. In some carriages the water after passing through the muffler is led through a coil in the smoke flue, to further raise its temperature before forcing it into the boiler.

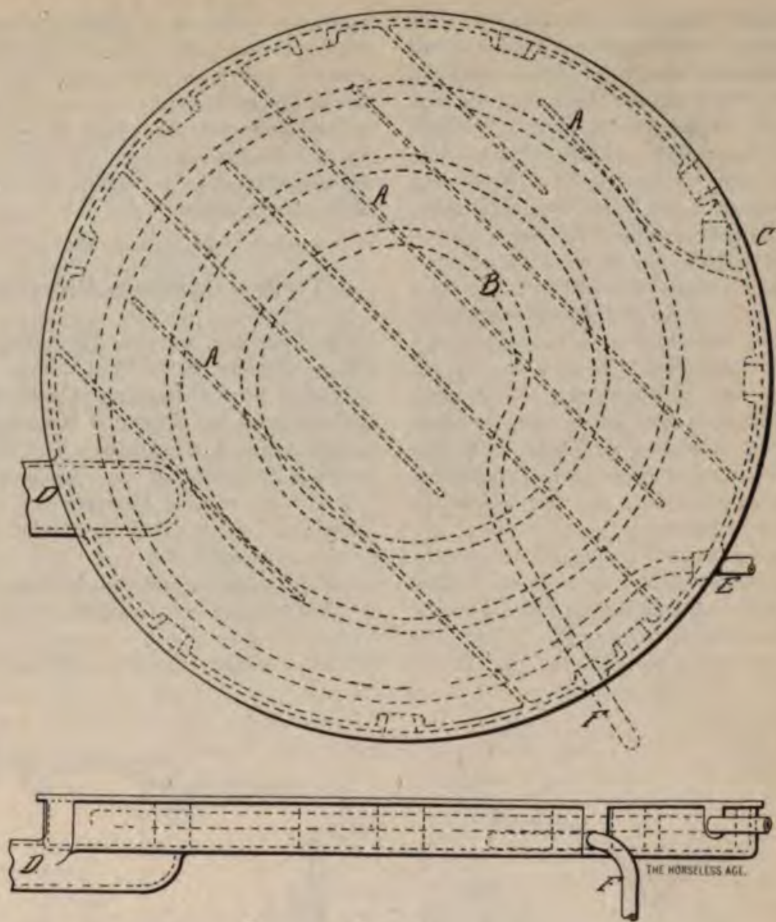


Fig. 1.

CONDENSERS.

A few steam carriages are now provided with steam condensers, which almost entirely prevent the loss of water and give the steam carriage a range on one charge of supplies nearly equal to that of a gasoline carriage. Another advantage of the use of a condenser is that it avoids visible steam issuing from the carriage, which occurs with an ordinary steamer on wet or cold days. The range of a steam carriage on one charge of water without condenser is at most 40 miles on good roads, but with a condenser a range of 100 miles is very easily obtained. The condenser is made in various forms, but the most familiar form of construction is that resembling the flanged tube radiator of a gasoline carriage which is placed in front of the vehicle. The engine exhausts into this condenser at the top thereof and the water which collects at the bottom of the condenser is pumped back to the water tank by a special rotary pump.

In passing through the engine the steam absorbs some of the cylinder lubricating oil. It is very objectionable to get any of this oil into the boiler, and an oil separator must therefore be provided.

SUPERHEATING.

The advantages of superheated steam—higher fuel and water economy—have already been referred to, and a number of fire tube boilers are now equipped with superheating devices. These consist of a coil of pipe of a single convolution arranged in the space below the boiler. This coil is connected by pipes leading down the side of the boiler into the steam pipe leading from the boiler to the engine, so that all the steam passing to the engine must pass through the coil and is thus superheated.

FLUE ARRANGEMENT.

One problem that presents itself in steam carriage design is to make the discharge flue for the burnt gases as inconspicuous as possible, and at the same time so as to give plenty of draft, prevent back draft owing to gusts of wind, and all possibility of the foul gases being blown into the faces of the occupants. The majority of carriages now employ natural

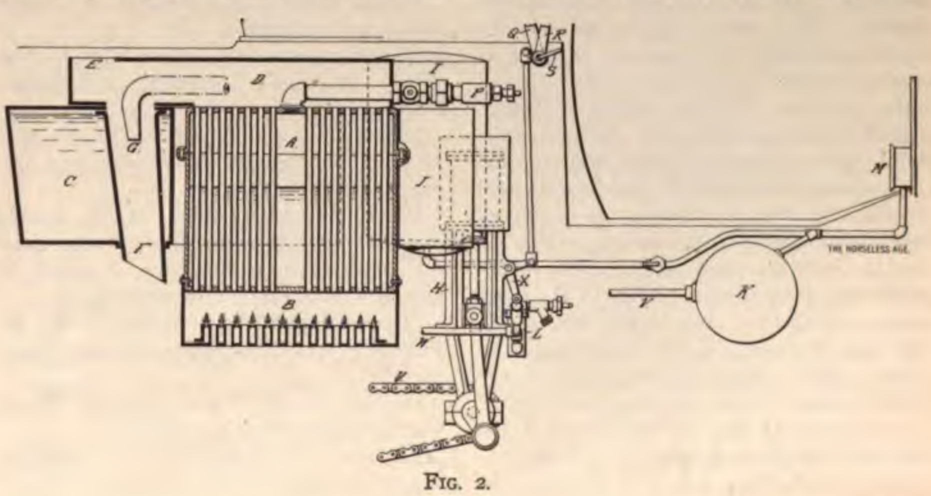


Fig. 2.

draft and upward discharge of the gases when standing, and forced draft and downward discharge when running. This may be explained by means of Fig. 2, which represents a vertical section through the motor equipment of a steam carriage. In this drawing A is the boiler, B the burner, C the water tank, D the flue for the hot gases on top of the boiler, which has two outlets, one upward outlet at E and one downward outlet F. In this downward outlet is arranged the discharge nozzle G of the exhaust. The upward outlet either abuts on a level with the top panel of the carriage case or extends slightly above it, and has a cross flue fastened to it, extending part way or all the way across the carriage case. Sometimes this cross flue is arranged just below the top panel of the body.

The air pressure on the fuel causes the fire to burn with considerable draft under ordinary conditions. The burning gases from the burner pass up through the boiler flues, back through the flue D and out through the upward outlet E when the carriage is standing, owing to their being lighter than air. When the vehicle is in motion it is, of course, much preferable to discharge the smoke downwardly, as otherwise it might become a source of annoyance to the occupants of following vehicles. With the arrangement of the downward flue and exhaust nozzle, as shown in Fig. 2, when the engine is running, the force of the exhaust discharge causes a suction in the flue, and causes the burnt gases to be discharged downwardly.

The water tank will be seen to surround the boiler, thus minimizing the waste of heat by radiation. Referring to Figs. 2 and 3, the other parts of the power equipment are designated as follows: H is the engine, I the air tank, J the muffler, K the gasoline tank, L the crosshead water pump, M the air pressure gauge, N the steam gauge, O the auxiliary throttle, P the throttle, Q the throttle lever, R the reverse lever, S the bypass lever, T the auxiliary throttle hand wheel, U the chain by which the power is transmitted from the engine to the rear axle, V the fuel feed pipe, W the water feed pipe and X the reversing bell crank.

This completes the series of articles on the steam carriage, and the next instalment of this series will take up the electric small calibre tubes.

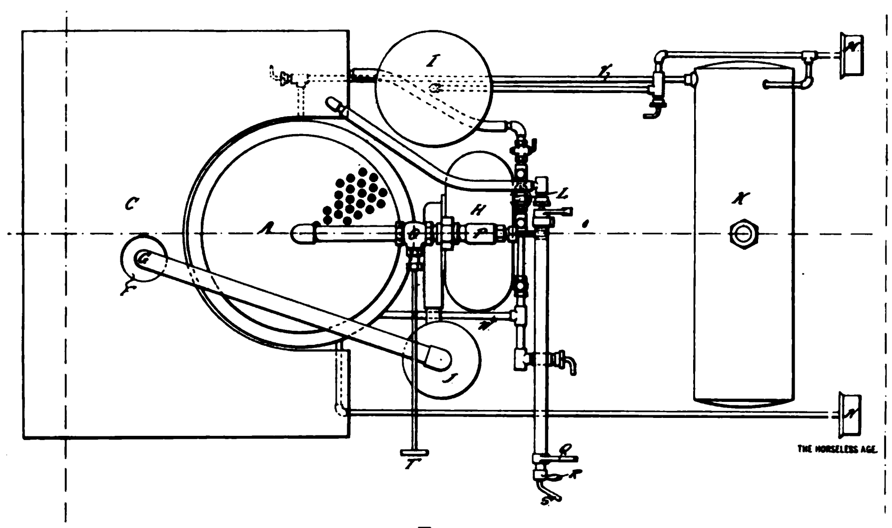


FIG. 3.

Trade Literature Received.

The Robinson Touring Car.—Pope-Robinson Company, Hyde Park, Mass.

Warner Spur Differential Gear.—Warner Differential Gear Company, Muncie, Ind.

The General Runabout.—The General Automobile Company, of Cleveland, Ohio.

Fountain Gasoline Carriage.—W. H. La Fountain, Twenty-sixth street and Liberty avenue, Pittsburg, Pa.

Goodson Igniter and Spark Plug.—Goodson Electric Ignition Company, of 116 Nassau street, New York.

The Eisemann Igniter.—Alfred Vischer & Co., 43 West Fourteenth street, New York city.

A Toot for Dixon's Graphite.—Joseph Dixon Crucible Company, Jersey City, N. J.

The Starley Motor Bicycle.—Starley & Co., of Coventry, England.

Pierce Motor Cars.—George N. Pierce Company, of Buffalo, N. Y.

Haynes-Apperson Automobiles. — The Haynes-Apperson Company, of Kokomo, Ind.

"A Few Advance Points on Toledo Motor Cars."—International Motor Car Company, of Toledo, Ohio.

Portable Accumulators, Hand Lamps and Electrical Accessories for Motor Cars. —General Electric Company, Limited, 67 Queen Victoria street, London, E. C.

"Poor Richard's Almanack."—H. H. Franklin Manufacturing Company, Syracuse, N. Y.

Packard Motor Cars.—Packard Motor Car Company, Warren, Ohio.

Elmore Automobiles.—Elmore Manufacturing Company, of Clyde, Ohio.

LESSONS OF THE ∴ ROAD ∴

Doc. and the Agent.—Both Sides of a Case.

BY C. WILL TRAVIS.

He, being a physician, was naturally interested in the new method of rapid and luxurious transportation—viz., the horseless method. Being naturally cautious, he had given the matter a great deal of thought and was still undecided as to what power to adopt, even after all had been tried by one or more city street and good road demonstrations at the hands of the agents.

The doctor had about concluded to defer the purchase until spring, although gasoline, so far as his ability to judge was concerned, appeared to offer the greatest advantages. It seemed almost certain that the doctor would give gasoline the preference, and before he made a final decision and purchase would devise some plan by which to make a final test of its merits in a manner in accordance with his idea of what service a machine should be able to successfully perform.

But what would the stunt be? It might prove fatal, but it would have to be tried, and what the outcome would be was the cause of no little anxiety on the part of the agent.

The doctor had taken the noon train for Boonville, a small town where he had relatives and to which he was frequently called to render professional service; and as the down train would not get him home until 10:45, he decided to telephone back home a request for a gasoline automobile to come to Boonville for him, if it was possible to make the return by 6 o'clock.

The distance is only 16 miles as the crow flies, but it is 18 if the hills are followed, and 20 by a level road, the greater part of which is sand.

The hills on the one road and sand on the other leave one but little to choose between when in quest of easy travel, and whichever road the machine came, by returning on the other one it would surely be a sufficient test of its power and ability to keep going.

Agt.—"Hello!"

"Yes, I can come for you."

"It's two-fifteen now; can start in less than ten minutes."

"Six? Sure."

It had rained hard the day previous and part of the morning, but the sun came out bright about noon, which was one thing in the agent's favor. He knew what the roads would be like.

There are several stretches of sand roads in this locality that will halt anything self propelled, unless taken after a rain. The hills of red clay, however, would not be improved by the rain, and the agent wa

e that no matter which way was taken going the doctor would more than like- want to return by the other road. So sand was chosen for going, to give the the chance to get its work in on the clay, and after nearly two hours' hard ving the machine reached its patiently ting victim—or was the agent to be the tim?

)oc.—Which way did you come?

gt.—Sand.

)oc.—How long did it take you?

gt.—An hour fifty-five.

)oc.—Can't you make better time re- ning by the other road? It is 2 miles rter.

gt.—If you'll allow for grades and mud ught to be one fifty-five plus, but we'll

)oc.—Are you ready? Don't need any oline or water?

gt.—Get in.

hey had reached a point about half way heir destination.

)oc.—It looks as though that horse and gon were mired in the mud.

gt.—Yep, wagon and load are too vy for one horse.

)oc.—There ought to be a law com- ing the use of a team for a loaded gon.

gt.—Then they'd make wagons bigger. omobiles ought to have two cylinders re they have only one, etc. The ma- ty are power shy.

)oc.—Is the road all like this?

gt.—Yep, only some of the hills are rse.

)oc.—Can't we take a crossroad and ke the sand? I had no idea a road ld get into such a condition.

Agt.—This is no worse than some parts the others, not considering the hills, d nothing to compare with the cross- ds.

Doc.—Don't you think I had better walk this hill?

Agt.—We've not stopped moving yet; ep your seat.

It was a scratch, but they made it.

Doc.—How far is it now?

Judging from the sound of things there as trouble brewing. The coil trembler ould need some attention very soon.

Agt.—Only 5 miles more to go.

The box in which the coil was located as partially held in place by screws rough the seat riser, or apron, and by ntly pounding the heel of the foot ainst this it would jar the coil sufficient- to cause the trembler to vibrate enough prevent its sticking, which it began to ow signs of.

Doc.—Here are the city limits; you had tter light the lamps.

Agt.—There's no oil, and it's not dark t.

Doc.—Evidently you don't think much the law. Aren't you afraid of being ar- ted?

Agt.—Oh, no; not s'long as it is day- ht. I'll get some oil if it is necessary.

Doc.—You don't move until you have to. In other words——

Agt.—Sometimes.

Would that leg hold out to the finish? It was now necessary to keep up an almost continual pound with the heel to prevent a dead stop of the coil. The sanitarium is in sight. It has been reached. They stop. The doctor steps out.

Agt.—How's the time?

Doc.—Six-fifteen. You are only fifteen minutes late after all, and the trip has been a most enjoyable and instructive experi- ence.

Agt.—Those were fine roads to test a machine on.

The doctor was noticing, evidently for the first time, the pounding of the foot against the cushion apron.

Doc.—Is your foot asleep?

Agt.—Nope, but the coil is.

Doc.—Well, stop in and see me during office hours tomorrow. Good night."

Agt.—G'night.

At the barn the auxiliary vibrator stopped to get out and open the door, the coil and engine took their cue to quit for the night, and the machine was *pushed* into the barn.

* * *

Doc.—Better make it for spring deliv- ery; say April.

Agt.—Thanks.

The agent had stopped kicking.

Experiences of an Indiana Doctor's Daughter as Family Chauffeur.

By K. E. D.

"I believe I would like to have an auto- mobile," said Dr. Jones one day when he came home to dinner.

"We can't afford one," said Mrs. Jones, as she stirred the potatoes which were fry- ing.

"Oh, my! wouldn't that be fine," said Mariah. "Yes, let's have one."

"I have been reading some auto journals on the subject," went on the doctor, "and I believe I could keep one lots cheaper than the two horses."

Mariah's face fell for an instant, for she did love horses and had always been used to handling them, and driving one when she wanted to, but the thought of learning to run an automobile, which she firmly re- solved to do, if one ever came into the family, helped her to decide that she could get along without the horses.

This was the beginning of many talks about how it could be done, and finally in the fall Dr. and Mrs. Jones and Mariah all went to Indianapolis to see what they could find in the way of automobiles.

The doctor wanted an electric, but upon the advice of a dealer he decided that a gas- oline vehicle would be the best for all prac- tical purposes, so one was ordered, as they were not kept in stock, and a goodly de- posit made by the doctor. Then he and Mrs. Jones went home while Mariah re- mained to visit some friends and wait until the auto should come, so that she could pay the rest of the money on it. When the time was up for it to be there it was re- ported lost, and lost it stayed for several weeks, but finally after much worry it came in one day, and the next morning after Mariah had paid the rest of the money on it she and Mr. Smith, a professional chauffeur, started home in it, a run of some 60 miles, through some of the most beautiful country in Indiana.

The machine was a little beauty, all shiny, with a 4 horse power engine, which took them spinning along.

Mariah felt very fine going home in her own automobile, for Dr. Jones had told her it was to belong to her.

The first stop was made 16 miles away from the city to give the puffing little ma- chine a drink. Women and children peeped from around the corners of the houses to see them as they sped off down the road. On through other towns they went, and finally in a small town stopped for dinner. Mr. Smith oiled and looked over the machine while dinner was pre- paring in the little hotel at which they had stopped. After eating and getting some gasoline at the hardware store they again sped on their way.

With a few other stops they arrived home at dark. It had some way leaked out that Dr. Jones had purchased an automo- bile, and as it was the first one in this little city, there was much excitement over it; and after Mr. Smith had taken the doctor to his office a great many people had a ride in the little runabout.

The next morning the real work of learn- ing to run it was begun, and by night both the doctor and Mariah knew how to run it, if everything stayed in repair. It took a little time to know how to regulate the gasoline so the sparking plug would not become carbonized; but those things were easier learned by experience than any other way.

Mr. Smith went back to the city after the first day and both the doctor and Mariah felt rather helpless, but kept on working with it, and for two weeks everything went along all right. Then one day the doctor had to go to the country and Mariah went along. When they got back to town Ma- riah took her father to the office and was coming home alone. The machine was running along smoothly, but without much power, as they sometimes do, when all of a sudden something happened. The last thing Mariah knew she was being violently thrown into the bottom of the machine, and that was all. People ran from all di- rections, and Mariah was picked up, cov- ered with blood, and taken into a house near by; Dr. Jones was telephoned for, and it was found, what might have proved very serious was mostly bruises and sprains, from which Mariah recovered in a few weeks.

But the machine was more seriously damaged; it had struck a bank, which

stopped it; the right front wheel was lying under the end of the axle, while the other wheel was a mass of twisted spokes and bent rim.

DEFECTIVE STEERING GEAR.

What caused the trouble was not known until the machine was examined, and it was found that a bolt in the steering apparatus had broken, letting the rod slip out, which jerked the hand lever away from Mariah, thus causing her to lose all control of the machine. The bolt was brittle, from being too highly tempered, and was crystallized. The rod, which runs just back of the axle was bent, and in trying to straighten it, it snapped in two, showing a weld with rusty ends. This might have caused a much worse accident than had already happened. In tightening up the machine afterward the bolt in the other wheel, corresponding to the one which had broken, crushed, showing it to be in the same condition. The firm which made the machine refused absolutely to do anything in the way of repair. So a good, practical mechanic in the town took hold of it and it was soon out again with Mariah guiding it.

TROUBLE ALL WINTER.

There was much trouble all winter. The cooling pipes, having no way to drain, would persist in freezing and bursting. The little wire fork which connected the pump with the main shaft kept breaking, sometimes two or three of them in one run of a few miles. This difficulty was finally overcome by this same practical man, who put in a contrivance of his own in place of the troublesome fork. Then the packing around the cylinder head kept blowing out; time and time again did this happen, and finally one day as Mariah was going down the street out went the packing with a great noise, leaving her sitting there motionless.

SHEET COPPER PACKING RECOMMENDED.

Whoever rides in or runs an automobile knows how everybody gathers and looks and small boys ask to ride when you are suddenly stopped in the street; but sometimes it happens that someone is able to give advice to some purpose, and when a man came along that day, who had been packing engines in a big factory, and told the doctor, whom Mariah had sent for, to pack his engine with sheet copper imbedded in white lead, the advice was taken and found to be excellent, for it did not blow out again.

In tightening up the cylinder head after packing, the threads into which the long bolt fitted pulled entirely out, taking a piece of the casting with it, and necessitating the use of a clevis around the cylinder head.

One day there came a big snow, and Mariah was anxious to see what her auto would do in that. She had read somewhere that if the wheels were wrapped with rope they would not slip, so she took all the clothesline she could find and diligently wrapped it around the front wheels, but was told afterward it was the back wheels to which she should have given the rope treatment.

The streets were full of children with sleds, who looked longingly at Mariah as she went by, not knowing whether they dared venture to tie onto the auto or not, but when she stopped and told them to come on they were not long in accepting the invitation. Soon all who could had their ropes around the axle, then those held to still other straps and ropes whose sleds went trailing off in a string behind. The little machine puffed and pulled and finally with a backward whirl of the flywheel everything stopped, and Mariah had to ask part of the children to let go, as she could not pull so many. Perhaps this was a little rough on the machine, but it was lots of fun for the youngsters.

Thus the cold, cold winter wore away, with the auto in the repair shop a good part of the time, and Dr. Jones using a horse, but with warm weather and more experience with the machine more use was made of it.

Mrs. Jones or Mariah nearly always went with the doctor on his country trips, for it did not take more gasoline to take two than one, and how they did enjoy it! Up hill they would puff, sometimes stalling, when the doctor would have to get out and push; then when they got to the top, how they would speed down the other side, around bends, across bridges, and on, until stopped by another hill, or sometimes a frightened horse. Both the doctor and Mariah grew to know all the horses, and just which ones would stand the auto and which would not, and always stopped when they found a horse showed signs of fright; but with all their care a few runaways occurred, but no serious damage was ever done.

A LONG TRIP

had often been talked of, but the doctor had not been able to get away, until in June he and Mrs. Jones started early one morning for a 40 mile run. Eighteen miles from home a stop was made for gasoline, then on through fine level country to their destination, which was reached before noon, fast time not having been made, for they had gone in the teeth of a strong wind all the way. Of course all the relatives had to have a ride, and all afternoon the little runabout was kept on the go. That night it poured rain, and the prospect for a good home run the next day was not very bright; but after dinner the start was made and for some miles it was a steady, hard pull with the hill climbing gear through the mud. Then the roads grew better and good time was made. On one long, level place, almost as far ahead as they could see, a horse and buggy had stopped and the occupants were hurriedly climbing out on either side to hold the horse. The doctor drove his machine carefully up and discovered a poor old horse, entirely blind, which never moved as he glided by.

The next trip was taken by Mariah and her mother. They decided one morning they would spend the day with friends who lived 16 miles away. The machine did not run very well for a time and no speed was made, but after a while it warmed up, and down the hills they went at a merry clip. Children would appear at farmhouse doors, and after turning round with one cry of "Automobile," the doors and windows would fill with people looking at the horseless carriage as it went flying up the road. Destination was reached in due time and the auto run into the barn to cool off, as it was pretty warm after its trip. The eldest son of the family was away at a distant farm at work, and was not coming home to dinner, but Mariah was not going to be cheated out of seeing this friend of hers this way, so away she went in the auto after him, bringing him back in time for the good country dinner. After dinner an errand to town was thought of, and the auto and Mariah were called into use for the 8 mile trip. Then grandma wanted to take a ride, as she had never been in an auto, so it was late when Mrs. Jones and Mariah started on their homeward journey There did not seem to be much power, owing to a too free flow of oil from the cup, which had gotten hot and thin, which Maria had not noticed, but about 7 miles from home the mixture of oil and everything must have gotten right all at once, for Mariah felt a sudden letting loose of everything, and it kept all her faculties busy from there on home to keep the flying machine under control; a good 60 miles had been traveled that day and a pleasant time spent with friends.

NEEDLE VALVE TROUBLE.

Then came more difficulty, the gasoline flow was giving trouble, and when examined it was found that the needle valve, when turned off, pushed against a square shoulder instead of an even surface, and had worn a thread, which had to be taken out and dressed smooth again.

THE BUZZER.

Then the buzzer wouldn't buzz and had to be adjusted every time the machine was started, and by that time the set screw would be jarred loose again, and have to be reset. Finally, to get any buzz at all it was screwed up so tight that new batteries had to be put in about every other day, for as soon as the edge was off them they would not buzz again. Again the practical man who had charge of this machine worked until it was again in running order.

TOWED HOME.

One day the doctor was called into the country, 5 or 6 miles out. He had been having some trouble with the auto; it was not sparking right and was jumping along, but he started on the trip in it, trusting to "good luck" to get him there. When about 2 miles from home it stopped and no amount of work could get it started, and as there happened to be some men going to town in a wagon the doctor asked to be allowed to tie his auto on behind, and came

back home. The practical man was called upon and again got it so it would run.

GEAR TROUBLES.

Just a few nights later there came another call for the doctor to go some 8 miles into the country. Again he started in the auto, and this time got 5 miles, when it absolutely refused to go farther; but it was accommodating enough to stop near a house, where a good friend of the doctor lived, so he went to his home, calling him up, telling him his troubles. He got his horse and buggy and took the doctor on to see his patient, then back to where the machine was left; it was tied on and brought into town in the early hours of the morning. Again the practical man worked one entire day before he discovered the trouble, which this time had been caused by a broken worm gear; a new one was put in and that trouble stopped.

One day Mrs. Jones needed some fresh eggs and said she wished she could get them from the country. Mariah saw a chance for a run in the automobile, so she said: "Well! let's go into the country and get some home made eggs." She immediately started out to oil the machine, and in a short time they were off. The afternoon was warm and cloudy, with a promise of rain later in the day, and the roads were in fine condition. Now 12 miles away lived some friends whom they had often talked of visiting but had never done so, so this afternoon Mariah guided her machine in that direction, thinking if everything went right they might, perhaps, go on to see these friends. Mrs. Jones did not know many people in this direction and kept insisting on going back and onto some road that they were better acquainted with, and where they would be more likely to get the eggs. So Mariah finally said: "I'll take you out to Laurel." "Oh, my," said Mrs. Jones, "I did not change my shoes before I started, and I can't go with this dress on." "Yes, you can," said Mariah, "anyhow, we will go on to Alpine." So there they made a stop, found some eggs, and when they inquired the distance on to Laurel it was only 4 miles, so Mariah said they could soon get over that, and on they went. Finally the last big hill was reached, and horrors! it was freshly graveled; but a good start took them part way through, and as the machine began to slow down again Mrs. Jones slipped out, thus taking out part of the load, and after stopping to allow the engine to gather power the top of the big hill was made. Then down on the other side into the town, and when near the friend's home a violent ringing of the bell brought the entire family out in time to see Mariah bring her machine round the corner and up to the gate with a flourish. A jolly hour was spent, Mariah busy taking the friends for short trips through the little town. It began to look more like rain and an earlier start home was made. Then on a steep hill there was some trouble with a horse which took more time, so when at least 6 miles away from home Mariah felt a drop of rain on her nose, then another and another, until a steady rain was falling; there was nothing to do but to go on, which they accordingly did, and when they arrived home it was in a much dampened condition but nothing daunted, for they had made a fine run.

CRANK CASE BOLTS BREAK.

Did you ever while in an automobile have one of the bolts in the crank case break? Well, you will think you are going to be bumped and kicked out at once. The doctor and Mariah each had that experience, and had it until all four of the bolts were broken. And what a time the practical man did have to get them out! They had to be drilled out, and were found to be of steel and so hard that they broke very easily; but after being replaced by bolts of common wrought iron no more trouble was experienced.

A NIGHT CALL AND A STALLED AUTO.

Late in the fall, when the weather was beginning to get cold again, Dr. Jones was called up one night about midnight. The auto had been doing very fine work for some time, until just the last few days it had given a little trouble, but he thought he would take it this night, for he was in a hurry. After he had been gone some time the telephone called again. Mrs. Jones hastened to answer and found the same parties telephoning again for the doctor. "Something has happened to your father," said she as she came back up stairs, "for he has had plenty of time to get there, but has not." Mariah's imagination immediately began to work up all sorts of things which could have happened, and she was getting pretty nervous when Dr. Jones' step was heard on the walk. He at once called for Mariah to get up and get ready as quickly as possible to go back with him, as he was in trouble, and he would go to the livery stable for a horse and buggy. Mariah was already up and dressing before he was gone and was all ready with a lantern and some matches in her pocket when he came back. It was cold, so cold that Mariah was chilled in a few moments, and the doctor, who had worked with the auto and then walked back home some distance, was perspiring, and with the sudden change to driving was also chilling. Mariah made him wrap himself up in one of the blankets which they had, and then putting the horse to his best speed they were soon with the patient. A dim outline of the machine in the fence corner was all they saw as they hurried by. Daylight had come when they returned and the lantern Mariah had been so particular to get was not needed. After tying the machine behind the buggy the doctor got in it to guide and Mariah drove the horse down as many back streets as possible to avoid being seen. Again the practical man was called on (what would Dr. Jones do without him?) and found the batteries run down.

TIRE TROUBLES.

Early in the summer the tires had begun to give trouble; they formed blisters, which grew larger and larger until they burst. It did no good to wrap the tire, as it was tried; so finally a new one was bought, and the old one that had given the most trouble was sent back to be revulcanized, but they proved no better than before, so that make was given up and another sort tried which was more nearly solid; these are still standing.

Thus the trouble goes on, and one needs a good lot of patience to run an automobile. Mariah is often asked if she would not rather go back to her horse, but she always says no; for while the auto is often out of repair, when it does go it is so fine that she is willing to take the unpleasantness along with the good. The doctor also likes it, although, as has been shown, he often is inconvenienced by it; but in the summer, and when it is in repair, he can get to his calls so much sooner, and can run about town so easily that he thinks in the long run he would not like to be without one. He would prefer a heavier engine than he has.

Good Advice from Country Doctor.

By O. I. Hess.

A year or two ago the editor of this journal, in commenting on the various reports of success and failure made by users of automobiles, wisely suggested that manufacturers should have fully in view the conditions under which their machines would be expected to give efficient service, that a vehicle that will fulfill one set of conditions can scarcely be depended upon to fill equally as well conditions radically different. This is indisputably true, and I congratulate myself on owning a steam wagon that has met all the conditions to which I have subjected it and has thus far given me no real trouble.

Whether the manufacturers of my machine have profited by the editor's remarks and have had in view the trying conditions that lie in wait for a country doctor with an automobile in Western Pennsylvania I cannot say, but I can say that the byways of a country doctor here do not lead over many "velvet lawns and smooth terraces," and that the topographical and meteorological conditions are about as varied as any in the United States, and to meet these conditions you want a vehicle so stanch and a power so flexible that you can rush over a railroad crossing, race along good, smooth roads, creep in ruts behind a heavy lumber wagon drawn by a lazy team till you find a place wide enough to glide by, slide down precipices, climb narrow, rough, steep hills, stand still with steam up to start at a moment's notice, wade through mud and sand and coke ashes, and face storms of wind and rain and snow and sleet and still have your fires burning bright.

Such are the conditions that the up to

date steam automobile should successfully cope with, and if yours cannot do it, you have not the right kind. I have had but one steam machine and I am not looking for another. It weighs about 1,200 pounds, has a 16 inch boiler that makes plenty of steam, a burner that never lights back, an automatic fire control, a pilot light, all necessary pumps, and carries about a barrel of water and 12 gallons of gasoline, amply sufficient for all practical purposes. I have never been stalled on any road or hill, nor have I been completely frozen up. The machine is not absolutely automatic; there are some things to watch and to attend to carefully. I do not know that I should care to ride on a machine that was absolutely automatic in all its functions. There is a pleasure in the consciousness of the power to control and in the exercise of that power, and the more automatic a machine is the less flexible it becomes, the further removed from one's control.

"HORSE SENSE" REQUIRED.

Let me say here to those who are about to sell their horses and buy an automobile that they should keep enough horse sense to run it. It requires just a little horse sense to operate and take care of a horseless wagon. You can ruin it in a few runs or you can make it serve you for years. If you have no one to teach you how to operate your machine—and you really don't need anyone—take the machine into the back yard and study the use of every bolt, nut, pin, wheel, valve and lever, look into every hole and corner in the machine and master the mechanism of all its vital parts; then fill up the tanks and light the fire. If you do not know how to do this latter, you can get your wife or the hired girl to show you. I may remark that it is always advisable to have water in the boiler before lighting the fire. After a while, a period of time as variously fixed by different makers, ranging, I believe, between one second and ten minutes, you will have steam. Now climb up on the seat—you will not need to buy the conventional cap and goggles just yet. Your boiler is now making steam right along, as shown by your steam gauge, and it would be well to hunt up the valve that controls the fuel supply; nothing, however, more alarming would occur, should you fail to reduce the supply of fuel, than perhaps the escape of steam from the safety valve. But this might tempt some inquisitive people to look in at you, and you are not ready for public exhibition yet. At this stage you might investigate the throttle valve, and this is better done with the rear wheels jacked up. Open the valve slightly and then close, then open again and close at short intervals, till water is worked out of the cylinders; then make things hum. Be sure, however, that you have the rear wheels jacked up good and firm, or you may find yourself in your neighbor's back yard, and just yet you want to "stay in your own back yard."

Try the brake, the reverse lever, the steering lever, all the levers, then shut off the fire and take a rest till the wee sma' hours of night.

A MIDNIGHT TRIAL.

About 12 o'clock, midnight, with a full moon is a good time to try the real thing. The coast is then clear, the streets vacated by all vulgar vehicles. The rude guy of the common herd and the solicitude of sympathetic friends will not distract your attention or detract from your pleasure. All being quiet, turn on the fire, mount the seat, seize the steering lever, gently open the throttle and glide out into the street. If you have a bosom friend, a strong man of a taciturn mind, you might take him along. You may need him. Having reached the street, if you have a park in your town that's not too far away, steer for it, as you will want to turn your vehicle to come back, and the streets of most towns are so narrow at times, and at this hour of night there will be no insolent policeman in the park to order you off the grass. Having completed your nocturnal perambulations you will return home with greatly increased confidence and a fair knowledge of the peculiarities of your new vehicle, the manipulation of which in a short time will become almost automatic.

Then take reasonable care of it and it will serve you long and faithfully. A few minutes spent in looking over the machine after each day's work or a long run, if need be making a slight adjustment, tightening a loose nut, correcting a leaking valve or joint, will amply repay you and forestall more serious damage to your machine and perhaps an accident when least prepared for it. A physician, from his training and habits of thought, more readily appreciates these suggestions—anticipates trouble an avoids it. You will soon learn the roads you use as to the way in which they affect your machine; and instead of approaching long, steep hills and stretches of heavy, sandy roads with your boiler empty and all the pumps working at full capacity forcing cold water into it, you will have a full boiler with a maximum steam pressure, which will be easily sustained and yield ample power to meet any reasonably protracted demand. As one locomotive engineer will haul heavier trains, make better time and get more service out of a locomotive under the same conditions than another, so it is with users of automobiles. The one who will master the situation, not a difficult task, will succeed and be pleased.

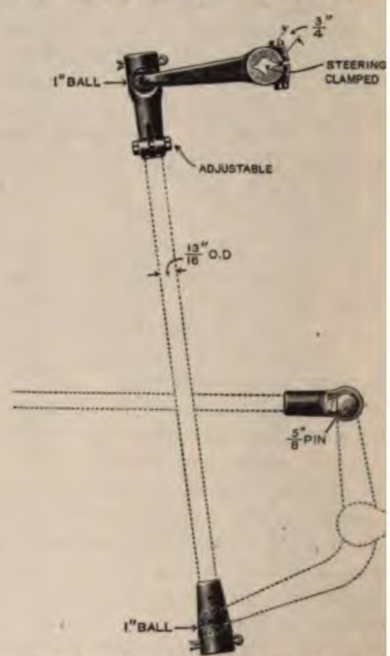
A Home Made Automobile.

Dudley Brown, of Stonington, R. I., is the owner of an automobile which is the work of his own hands, and nearly every piece of wood and metal in which has seen service before. The wheels were used in an old mowing machine, and the body is composed of rough timber. The motive power is a steam engine formerly employed to operate a threshing machine. It is said to be capable of rolling off 25 miles an hour.

NEW VEHICLES AND PA

The "B. & S." Steering Connect

A new set of steering connectio been placed on the market by the B & Spencer Company, Hartford, These connections are drop forg best steel for the purpose, and ma and hardened so that they reach the mobile manufacturer practically re apply to the vehicle. These conne



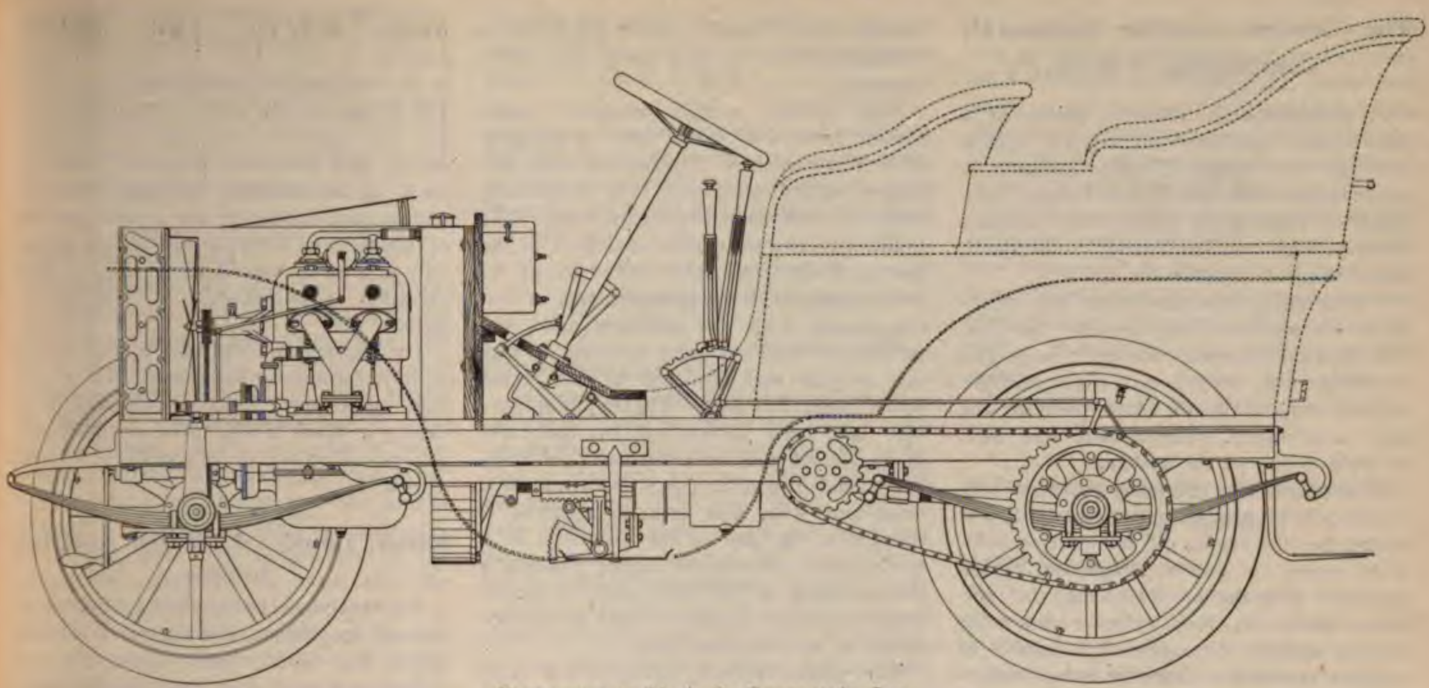
"B. & S." STEERING CONNECTIO

are listed by the manufacturers in so that users can get complete sets individual parts as may be desired. form and style of these connection body all the desirable features o French patterns, with improvemen same in the way of adjustment. connections are manufactured under land's patent and are carried in sto immediate shipment.

The Motor and Gear Manufactu Company's Design.

We show herewith an elevation, in section, and a plan of a touring c signed by the Motor and Gear Ma turing Company, of 136 Liberty New York, who are exhibiting this at the Madison Square Garden Show

The design follows European pr and combines a number of features acteristic of some of the best known pean makes. The frame is of arn wood of deep section, the one here s being designed to carry a 16 horse two cylinder motor and correspo gear. To avoid the use of buffer b and yet admit of the use of long, wid thin springs, with a wide range of ment, both the front and rear axle cranked to prevent shock and conse breakage of springs or other parts.



ELEVATION OF M. & G. COMPANY'S CAR.

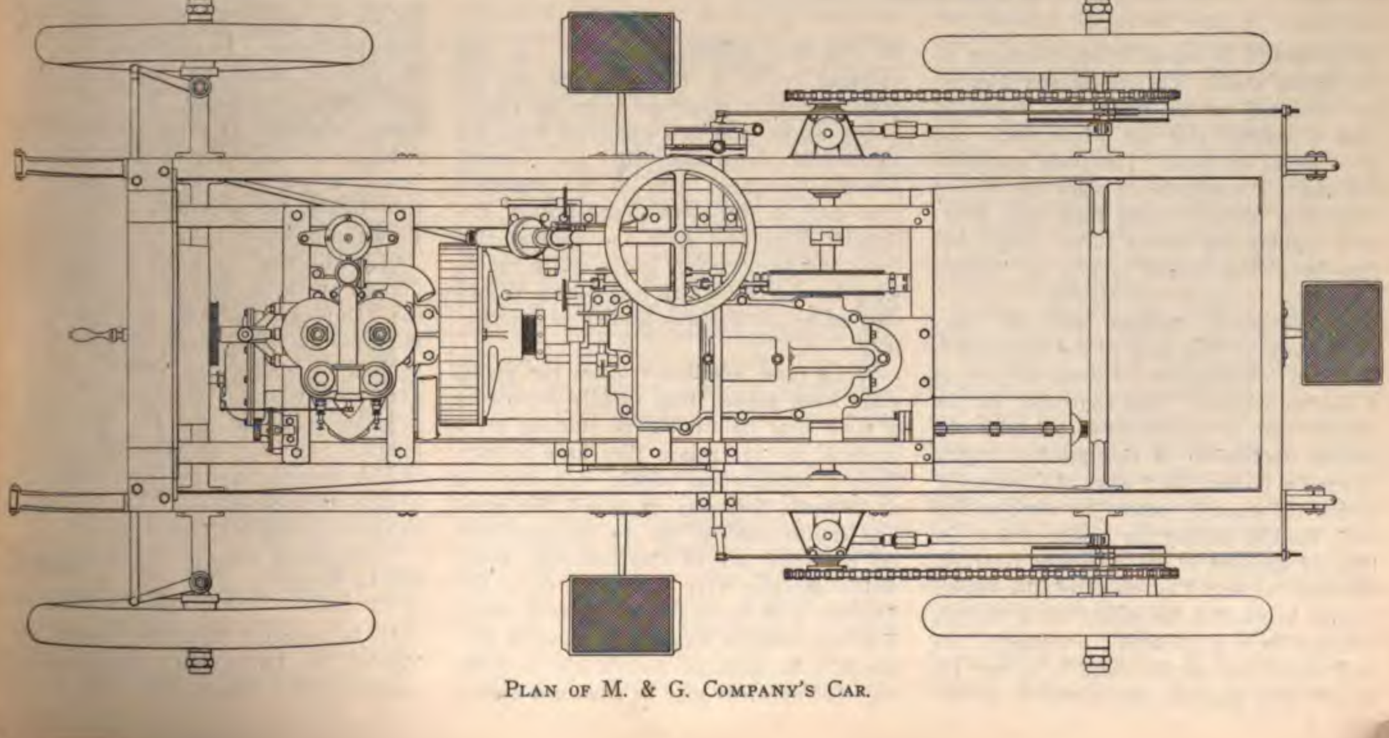
tread is standard and the wheel base long, in accordance with modern practice. Wheel steering, through worm and wheel sector, is employed, and double independent systems of brakes are provided. The foot brake acts on the differential gear, and a powerful and rapid hand brake on brake drums forming part of the rear wheel hubs.

The motor shown fitted to this vehicle is the company's 16 horse power two cylinder standard design. Single cylinder and four cylinder motors of the same cylinder dimensions will also be manufactured by the company. The cylinder heads are cast integral with the cylinder bodies, and the water jacket completely surrounds each of the cylinders and of the valve chambers, the water leaving the jacket on top.

The makers state they have made it a particular object to produce a very efficient cooling system, so as to enable the motor to run an unlimited time on low gear and heavy load without overheating. They therefore employ a flanged coil radiator in front, the efficiency of which is augmented by a fan behind it, driven from the motor, which increases the speed of the air currents passing through the radiator. The motor is governed by a centrifugal governor, arranged horizontally on the cam shaft and acting by throttle on the intake.

The power is transmitted from the motor through a conical clutch in the flywheel, the end thrust of which is absorbed in a novel manner, to a sliding gear transmission, giving three speeds ahead and one reverse, all actuated by a single lever without the use of cams or latches. The drive on the high gear is direct from the motor to the countershaft. The gears and differential are enclosed in an aluminum case, which is designed with heavy webs and flanges to obviate any possibility of breakage, which has recently not been uncommon with aluminum gear cases.

The chassis is particularly intended for touring cars, but the makers have also had in view the adaptation of the design to slow speed commercial vehicles, such as delivery wagons, hotel omnibuses, etc.



PLAN OF M. & G. COMPANY'S CAR.

The General Electric Company's Combination Vehicle.

A photograph is herewith shown of a combination gasoline and electric vehicle built by the General Electric Company in conjunction with the Grant-Ferris Company, of Troy, N. Y. The latter company furnishes us the following information about this vehicle:

The running gear and body are essentially the same as those used by the General Electric Company for their large size steam carriage, only a few slight changes having been made to adapt them to the new combination. The vehicle was built to make a test of the system.

The vehicle was originally equipped with a two cylinder engine, but upon trial it was found that the engine did not develop sufficient power nor run at a sufficiently high speed to give the proper voltage for efficient work. A four cylinder motor of smaller cylinder dimensions but capable of a higher speed was therefore substituted.

As will be seen from the photograph, the dynamo is direct connected; in fact, the armature is keyed to an extension of the engine shaft. The engine and dynamo are mounted on an angle iron frame in such a manner that the whole outfit can be removed en bloc. The body construction made it necessary to place the motors somewhat farther ahead than was desirable, making the chains rather long; but they have been found to give no trouble when kept at the proper tension.

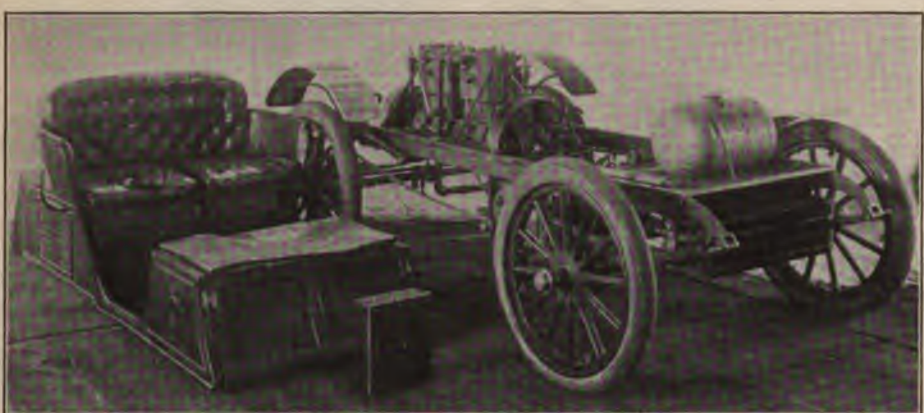
The vehicle is equipped with two electric motors, so that each of the rear wheels is driven independently without the use of a differential gear. The controller for the electric motors is interconnected with the timing mechanism of the gasoline engine in such a manner that when the controller causes the electric motors to work at full load, thereby pulling the engine down, the time of ignition is automatically retarded, and vice versa. The speed of the engine is also controlled by means of a throttle operated by a pedal lever; pressure of the foot opens the throttle and a spring returns it to a position determined by an adjustable stop, which leaves the throttle sufficiently open to just keep the motor running.

The vehicle weighs complete 2,600 pounds, and will carry four passengers. It is fitted with a combination volt and ampere meter, placed on the dashboard, where it may be conveniently read. The engine and electric generator deliver to the motors 12 electrical horse power for an indefinite period. Some difficulty was at first experienced with the radiating coils, the surface provided not being sufficient to take care of the heat absorbed by the jacket water under full load. The radiating surface had been determined by the rules given by different manufacturers of radiators, and the discrepancy between these rules and what was actually required is thought to be due to the fact that in a combination vehicle the engine practically always works at full load, while in an ordinary gasoline vehicle it only rarely operates at its maximum load.

The vehicle recently made a trip from the works of the Grant-Ferris Company in Troy, N. Y., to the Schenectady works of the General Electric Company. It was operated by W. S. Howard, who was accompanied by a machinist from the Grant-Ferris works, and two engineers from the automobile department of the General Electric Company. One of the engineers took part in the New York-Boston Reliability Run, and gave the opinion that there had been no hill in the entire run as steep as the one which leads from Watervliet up to the highway leading to Schenectady.

While most gasoline vehicles can go up quite steep grades, they usually experience a good deal of trouble in starting on a grade if for any reason they have to stop. With a combination vehicle, if a stop has to be made part way up a hill, the gasoline engine can be run up to speed and the controller set on the first step, which makes starting very easy and sure, and does not pull the engine down as it would if it was directly connected by means of a clutch. As soon as the vehicle is under way the controller may be advanced several notches. With this particular vehicle the increase in speed from one step to another is so slight that it is scarcely perceptible. When the vehicle comes to the top of a hill the engine is stopped by opening a switch, and then the controller is brought back to the braking position. Then the motors are driven by the vehicle and act as generators, allowing the vehicle to run only at a certain speed, an increase in speed resulting in an increase of electrical resistance.

The experiments with this vehicle are said to have been sufficiently successful to warrant the General Electric Company in ordering a 5 ton truck, to be equipped with a large motor and to be completed by April 1 next.

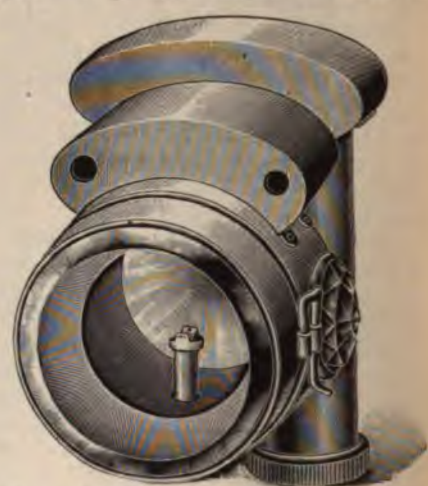


G. E. Combination Vehicle.

Miller, Daniels & Walsh Acetylene Lamps.

Two acetylene automobile lamps are exhibited by Miller, Daniels & Walsh, for which they claim several advantages.

One is a small size, intended for use on light automobiles, and is called the "Duplex." It is made entirely of brass, and



follows the prevailing French style in general appearance. In operation it is said to be entirely automatic, the generation of gas being regulated by the burner. Special attention is given to the thorough cooling of all parts by air circulation. The lens is 4 inches in diameter, and colored side lights are provided. This lamp is shown in Space 9 at the Automobile Show.

"Le Militaire" is a much larger lamp, though operating on the same principle as the "Duplex," and said to possess all its good points, being made of brass, with air cooling, automatic regulation, etc. The generator, which is detachable, is said to generate sufficient gas for two ordinary lamps. The beam of light from this lamp is wide enough to show from curb to curb of the average street. "Le Militaire" is exhibited at Spaces 15 and 16.

The makers state that these lamps cannot be jarred out.

It is reported that the Scott Motor Works, St. Louis, Mo., contemplates locating at Fort Wayne, Ind.

COMMUNICATIONS.

Road Experiences.

BRIDGEPORT, Conn., January 4.
ORSELESS AGE:
leman in this city who is the own- eam machine had a breakdown on an isolated part of the State and eek the shelter of an old sawmill repairs. It was not long before ulty was overcome and he pro- oyfully on his way—for a short Then the machine stopped, much tonishment, as he had 200 pounds on and everything apparently in ler, but upon getting out of the to investigate he found that the d engine were entangled in a mass streamers which had been coming safety valve. These had so en- he machine that it was impossible until he removed them and he had onsiderable care for the next few t to have a similar occurrence.
s much nonplused for a solution trange happening until he looked water tank and found that it had f filled with resinous sawdust by son wishing to play a lark on him. percolated in some strange man- gh the checks, thus into the boiler got out of the safety in the man- ibed.
r gentleman in this city, owner of c machine, one night at dusk ran soline and went into a farmhouse elp. The farmer told him he had ived a barrel of gasoline which he ght for his wife's cooking stove he was at liberty to help himself, o down into the cellar and fill a , which he had given him, and if not sufficient to come again. The ful was all right, and he got the which the farmer had mentioned it into his tank and found that he eed another pail and returned to .
ticed that there was an enticing f old cider and he hunted around struck a spigot, from which he copious draught, which he drank t gusto. To be vulgar, this put an him and he had lost his bearing st where the gasoline barrel was, t what he supposed to be gasoline il and went out to put it into his After having paid and thanked er, he started off, but in going the village he noticed that all the were running along the road in of the machine. He stopped to te the cause and found that they king up candy balls, which were ed through the muffler at every n of the engine. He had struck g barrel in getting the second pail-ful and put maple sugar into his gasoline tank, thereby turning his machine into a transitory candy factory.

VERITAS.

[It is a pity the late Baron Münchausen did not live until the arrival of the automobile era; it would have offered him great opportunities in the line of literary work he pursued.—ED.]

Automobiling in Cuba.

HAVANA, Cuba.

Editor HORSELESS AGE:

Automobiling here is still something of a novelty and the machines are as yet very scarce, there being only three or four in the city of Havana; but the future prospects are very good. The main roads here are very good, but some of the side roads are poor. However, we can ride two or three hundred miles from Havana on good roads with much comfort, and I would advise all tourists coming here, who own automobiles, to bring their machines along, as it is about the only possible way of seeing the country well, owing to the very poor railway service.

Of course, automobiling in Cuba also has its disadvantages, the most important undoubtedly being the absence of good repair shops. There are not many good mechanics here and they are very slow, the only thing which they understand thoroughly is to charge up for their work; and they certainly make the Americans pay for what they get. I once had a rear spring welded, for which job I had to pay $25. The price for the same work in the United States would have been only one-fifth of that. There are no road regulations here, apparently, and the natives drive on the highway in any old way, which causes a chauffeur considerable bother. If you blow your horn to clear the way they are almost certain to get on the wrong side of the road, and if you were as slow as they are there would be more chance for an accident than there is now. The climate is fine and the general health of the people is very good. The roads are kept very well, and they are now cleaned the same as American streets. I was indeed surprised to find the roads here in first class condition.

When I came here, about two months ago, I brought a Fournier-Searchmont with me and have had excellent results from it. Thus far I have had no trouble of any consequence. We are now receiving a new machine of the same make, the Type VII, and we just received a new 8 horse power De Dion from Paris, which is also doing fine work.

I think this is one of the finest countries for automobiling, as you need no furs to bundle yourself up in and you can let your auto stand for any length of time without danger of freezing or other trouble. Automobiling in a country without repair shops may seem very inconvenient to some people, but I find that when a man is thrown on his resources he becomes a better chauffeur. When a chauffeur knows that everything depends upon his own personal attention, he will be more careful and watch every part of the machine more closely, which will result in the prevention of accidents in accordance with the old saying, "A stitch in time saves nine."

At this time of the year when the North is mostly snowbound, how pleasant it is to take a ride over the fine roads of Cuba, and if you should come here and investigate for yourself I am sure you would appreciate the charms of automobiling in Cuba during this season.

GEORGE J. TRAUTZ,
(Chauffeur of U. S. Minister Squires.)

Was Overcome by Poisonous Exhaust Gases.

Editor HORSELESS AGE:

I have often had a ringing in my head after working around my automobile, and attributed it to the jar and noise of the machine, but after my experience of yesterday I recall that this ringing sensation occurred after working over the carburetor in attempting to better the admission of gasoline.

My machine has not been out of the motor house since January 1, on account of the cold, poor roads and snow.

The young man who cares for the machine starts up the engine every two or three days so that we may always be ready for the road. I was working at the bench adjusting a spring of a music box when George came in and said that one cylinder was thumping when he had the engine running a couple of hours earlier. I told him to start the machine and shut off one engine at a time and ascertain which cylinder was not acting properly, and then admit more gasoline until the engine ceased to miss explosions. I continued to work at the bench. He did as I told him, and not getting the result desired, called me over to the machine which was running, pounding badly and giving off partially burned gas that rose into our faces in a thin, bluish vapor that made the eyes smart. We both stood in this vapor for perhaps a minute and a half. We then shut down the engine and I adjusted the gasoline intake for more gasoline, the smarting of the eyes from the vapor indicating to me a weak mixture.

George cranked the machine and then stood by the seat to regulate the velocity of the engine, while I adjusted the supply of gasoline, increasing and decreasing back and forth for perhaps five or six minutes, with my face right in the deadly vapor, until my head felt as though a thousand wheels were grinding inside. George shut down the machine and I returned to the bench, taking my work out of the vise, intending to go into the house and not admit my weakness to George.

The motor room is about 23 feet wide, 33 feet long and 14 feet high, heated by a cannon stove, and as near airtight as a

well constructed brick building can be made. The temperature was probably from 65° to 68°.

George told me afterward that his head was also feeling queerly and that he went to the door twice for air.

To return to the time when I took the spring out of the vise—the next thing I knew George was throwing water in my face and helping me onto my feet, and I said, "I'm all right now," standing up to the bench again.

George went to the door again, and as he opened he heard me fall against my little machine and settle down onto the floor, striking my head a good blow on the concrete pavement.

I must have been unconscious this second time five or six minutes, as George had time to drag me to the door, summon the maids from the house and run across the street and fetch a couple of men. My pulse was strong throughout.

While unconscious my jaw remained locked, and I came to greatly nauseated, relaxed and weak, and broke into a profuse perspiration. After ten minutes I was able to walk into the house, aided by George and one of the maids. George suffered no ill effects beyond the dread of letting me know that he felt uncomfortable.

I understand that this kind of an accident has happened before, and the fact has been so well guarded that it did not come to the notice of the press, because it might have been detrimental to the interests of automobiling and a certain automobile manufacturing company. I trust THE HORSELESS AGE is fearless enough to publish this letter and bring this danger to the notice of automobilists and scientists, in order that the one may avoid an untimely death and the other explain just what horrible chemical joke made me its victim.

I believe many users of gasoline engines have had "that tired feeling" working over their machines, due to this same cause, and did not realize their proximity to a deadly vapor. Perhaps in the future they will avoid this thin blue vapor, as I intend to.

LOUIS E. LAFLIN.

[When our correspondent intimates that his mishap was due to a fault in the construction of his machine he does an injustice to the manufacturer. The manufacturer cannot change the laws of gasoline combustion and is as little to blame for an accident of this kind as a gas company is for the results if somebody blows out the gas.

When gasoline is burned mixed with air in proper proportion or with an excess of air, it forms carbonic acid gas, which, when present in the air in considerable quantity, makes breathing difficult, acting as a suffocant. When an excess of gasoline is fed to the cylinder, carbonic oxide gas is produced, which is a poisonous gas. Such gas is sometimes emitted by coal stoves which have no draft, and fatalities caused by such gas leaking into a room are occasionally reported in the papers.

We know from experience that when an automobile engine is kept running inside, with little ventilation, those working around the machine are likely to experience an acute headache. This can, of course, be avoided by conducting the exhaust outside the building, or by opening doors and windows. We have never before heard of anyone having been overcome by the exhaust gases. The whole trouble is, of course, most easily remedied by providing plenty of ventilation in the building or by only running the engine outside. This is, moreover, the only remedy, so far as we know. A blue exhaust indicates too much gasoline.—ED.]

A Boy's Automobile.

Editor HORSELESS AGE:

I send you herewith a photo of an automobile built by D. Ogden, manager of the Western Union telegraph office of Columbus, Ind., for his son, Hubert S., 3 years and 4 months old, who is shown occupying the seat of the vehicle. Mr. Ogden

HUBERT OGDEN IN HIS AUTO.

did all the work, except the painting and building the wheels, in a little experimental shop on his premises during odd times when he was not at his office, and occupied nearly six months in building it. The wheels are 20 inches in diameter, and are equipped with 1½ inch pneumatic tires. The vehicle has a live rear axle carrying the differential gear with a band brake upon it. The frame is made of three-quarter inch angle iron and supports the 1¼ horse power motor which is located in front. The motor has jump spark ignition, a Dyke bicycle motor carburetor and employs gravity oil and gasoline feed. The body is 38 inches long and 16¼ inches wide and the height of the seat from the ground is 26 inches. The front is left open to allow free circulation of air around the motor cylinder. The gasoline tank is located under the seat. Ignition is controlled by a lever on the left of the seat. The speed is controlled by a forward pressure on the lever shown at the left in the cut, which operates a friction drive giving a variation in speed from 1 to 7 miles per hour. The brake is operated by the foot and the steering is controlled by a tiller located on the right. The body is finished in black with red stripes and is upholstered in leather; all bright parts are copper plated on brass and every running part is supported on ball or roller bearings.

The little chauffeur handles the levers very skillfully and has frequently made the run from his father's office to his home in the suburbs of Columbus, a distance of nearly a mile, which he accomplishes at a speed of 5 miles per hour. His father always accompanies him on a bicycle.

B.

A New Attack of the "Fever."

Editor HORSELESS AGE:

Please send me two extra copies of the Doctors' Number. I think it fine, very instructing. I have felt that my trouble with the auto was not curable, but after reading the many mishaps and experiences of others I take heart again and a new attack of the fever is on. And I will go to the show in Chicago this spring again and have my faith renewed.

A. O. PITCHER.

Wants Electric Experience.

Editor HORSELESS AGE:

I would like to see some space in your paper devoted to the experience of electric vehicle owners. There must have been hundreds of these cars sold and in use, but very little experience recorded in your good paper. The present and prospective importance of this type of automobile I believe should entitle it to the a proper share of space.

Under certain conditions and for special service this type of car is already a success, or as nearly so as are its rivals for their work, and I believe that articles on the operation of the electric car would be of great interest to a large number of your readers.

CHARLES S. WHITNEY.

A Pleasure Trip in California.

Editor HORSELESS AGE:

Being an automobile enthusiast I send you herewith a brief account of a very delightful trip we recently took from San Diego to Escondido, a small hamlet in the Cuimaca Mountains, a distance of 36 miles over long grades and through most beautiful mountain scenery.

We left San Diego about 2 o'clock p. m. and arrived at Escondido at 5:20 p. m., making good though not unusual time. San Diego is a city of hills, but we had climbed all of them and were anxious for new fields to conquer; and with some trembling we ascended the first steep grade, a rise of 400 feet in a distance of 1 mile, to La Mesa. Our first "goblin" was the San Diego River, which, like all California rivers, runs top side down,

leaving much heavy sand to get through, which Pegasus went through bravely and with little loss of time. Then came the grade, which looked most formidable. Putting on the hill climbing gear we took a breath and slowly but surely climbed the grade, without even a road runner crossing our path, until the first sharp turn appeared, when, to our extreme discomfiture and alarm, we sighted a four horse team with a heavy load.

We had been warned by timid folks that one's life was endangered when encountering these mountain travelers upon the grades, but thanks to the progressiveness of the age we were not molested, and journeyed on to our destination, unharmed, over deserted road about 10 miles in length across to La Mesa; there was not a building in sight, but we met numerous parties going to San Diego. The most desolate part of the road was where it led through a deserted village, but we were soon brought back to life by a huge wild cat which evidently had never seen an auto before and which was not so eager to seek cover as we wished.

Having heard so much about straw roads, we were naturally desirous of seeing one, and our wishes in this respect were gratified when we came to a very fine specimen of this kind of road, about 5 miles long, which entered into Escondido. Over this road our machine fairly flew. It slipped some, but nothing to compare with the skidding on wet clay. San Diego has not yet been visited by many automobilists, and if they come here from Los Angeles they seem to feel that there is nothing worth seeing about here but Tia Juana, and return to the North as soon as the trip has been made.

We have been living here for our health and pleasure since October last, and have therefore made many trips about this most beautiful city and vicinity; and I assure you we have never enjoyed automobiling more fully than we have here. We went to some places that some of the residents have never visited and also to some of which they doubted our ability to go. Alpine is one of these, and for beautiful views, unexpected turns and inspiring grades, one will have to go a long way to find an equal. One grade is 4 miles long, and as the road is only 12 miles wide and very crooked we were obliged to back and turn several times to make the curve, and it took us one hour to descend. During this descent we met one mule team and one horse team, but with careful handling of both machine and teams no harm of any kind was done.

Another place very different from anything else I have seen is La Monte, a long canyon road from Lake Side, and there one sees the most beautiful live oak grove imaginable, with a fine road curving and turning around these giants and with the beautiful, rocky El Cajon Mountain for a background.

We have visited with our machine nearly all the places of interest about San Diego, including the Scripp's ranch, which is situated 60 miles out on La Mesa, commanding a fine view from the house of Point Loma and the ocean. La Jolla is one of the ocean views of beauty, and after enjoying our lunch, picnic fashion, in December last, we returned home by way of Rose Canyon.

One living in the Eastern or Middle States cannot appreciate what automobiling means in this broad, beautiful California, and surely says "The earth is the Lord's and the fullness thereof."

One year ago we journeyed by automobile from Cleveland, Ohio, to Albany, N. Y., in an old country compared to California. The roads here are far better than the Eastern roads, and this glorious climate makes automobiling an enjoyment excelling all others.

Our machine has been most honest and never have we backed down from any of our undertakings. We simply adore our "Pegasus," with his great strength and willingness far excelling our dear little steam Peggy, though she took us thousands of miles, but with much thirst to be quenched.

We are contemplating a journey to Los Angeles in a few days and I shall jot down the most interesting features of our trip.

J. Perrin Bousfield.

Sweetwater Dam, Cal.

N. A. A. M. Banquet.

The following is a list of the speakers and the subjects which will be dealt with at the annual banquet of the National Association of Automobile Manufacturers, to be held at the Waldorf-Astoria on Friday evening, January 23:

Hon. Jacob A. Cantor, "The City of New York"; F. S. Fish, "Horse Carriages and Motor Cars"; F. L. Smith, "How to Sell an Automobile"; T. C. Martin, "Electrical Matters Pertaining to Automobiles"; Hon. John S. Wise, "What Lawyers Hope for From Automobiles."

Some of the Exhibits.

The Veeder Manufacturing Company show, in addition to cyclometers, odometers and counters for all varieties of vehicles and other purposes, a new speed recorder for automobiles in which the speed is indicated by the height of a column of colored fluid in a graduated glass. This will be described in detail in a later issue.

The C. J. Moore Manufacturing Co. show bodies and running gears suitable for 8, 12 and 16 horse power motors. These can be furnished, finished or unfinished, separately or together. A complete carriage is shown having a French type tonneau body, with two cylinder vertical motor in front, chainless drive, three speeds forward and reverse, 32 inch wood wheels with 3½ inch tires, 82 inch wheel base, weight 2,500 pounds.

The Rose Manufacturing Company's acetylene lamps embody several new features. In their latest patterns the generation is controlled by the pressure of the gas acting on a rubber diaphragm, which in turn controls the water feed. Fluctuations in pressure are thus reduced to a minimum. In another style the water is led through a goose neck, so that if the drip is stopped by the pressure of gas it will start again by a syphon action. A third style has a space in the back where an extra can of carbide can be carried. The Rose Manufacturing Company turn out lamps of all kinds, from 2½ to 12 inches face.

The Post & Lester Company, of Hartford, Conn., show a large and complete assortment of automobile sundries. Among the specialties are a Holley running gear, complete with 5 horse power Holley motor and tires, imported French Volier horns; the Fox valveless steam engine; the Salamandrine boiler; a steering wheel, made by Hussey, Detroit, which turns back on a hinge, obviating the weakening of the column by the usual joint; and the Knox water gauge reflector, which shows the

water as a red column the size of the gauge glass and the steam as a thin red line.

THOMAS J. WETZEL.

The Midgley tubular wheel, the "Bann-Auto," a new wood wheel, made by the Muncie Wheel and Jobbing Company, Muncie, Ind., the Timken roller bearings, steering knuckles, hubs and axles, and the Brown-Lipe equalizing gears and the new Brown-Lipe steering gear, which was described some time ago, are shown by Thomas J. Wetzel.

A novelty in wheels is the Midgley "Chariot" wheel. This is a tubular wheel of the regular Midgley build, but the spokes are somewhat larger than usual and every other one is enlarged at the centre, where a brass bolt, with a round and highly polished head, passes through to secure the driving sprocket or brake drum. Another Midgley wheel is made with large spokes, being very similar to a wood wheel in appearance.

BADGER BRASS MANUFACTURING COMPANY.

The "Solar" acetylene gas lamps, made by the Badger Brass Manufacturing Company, have been improved by the addition of a valve, which controls both gas and water simultaneously. This valve is applied to all the 1903 models of the "Solar," and is the only important change made, other features being considered entirely satisfactory as heretofore constructed.

This company also exhibits an automobile jack with a rack and pinion movement, the pinion being actuated by a worm, to which the operating handle, a box wrench, with cross handle, is applied. The jack can be instantly raised to the limit of height by simply pulling up the rack. This throws the worm out of gear until the rack is dropped, when it falls into gear by its own weight. There are no springs, pawls or other small parts. It is made in several sizes, the smallest having a capacity of one ton and a lift of 7 inches.

THE WHITNEY MANUFACTURING COMPANY,

Hartford, Conn., show roller and block chains and sprockets in great variety and all sizes. A specialty is the Wizard chain and sprocket, which is being used, it is stated, with success for driving circulating pumps on automobiles, the work being done at a high speed, and with perfect noiselessness. The chain is of the "saw tooth" form, the teeth of the sprocket consisting of hardened round steel pins, set into a flanged steel sheave, at suitable intervals. These pins can be removed and replaced when necessary.

THE CONGER MANUFACTURING COMPANY,

of Groton, N. Y., have on exhibition quite a large variety of the Stolz gasoline motors, with single, double, triple and opposed cylinders, all of the four cycle type, from 3 to 24 horse power. The 14 horse power opposed cylinder motor is of exactly the same construction as the smaller sizes of the same type. Both inlet and exhaust valves are mechanically operated. Ignition is by jump spark, the current being distributed where more than one cylinder is used, by the commutator on the cam shaft. Cylinder, head, valve chamber and their water jackets are all one casting. Cranks are large, self oiling and enclosed. Control is by throttle and shifting spark. Cam shafts and their cams are in one piece. The cylinders, in the opposed cylinder motors, are directly in line.

THE GLEASON-PETERS AIR PUMP COMPANY'S

exhibit of air pumps includes hand, foot and power air pumps of all kinds, oilers, gauges and fittings, tanks and other appliances for handling compressed air, vacuum pumps, foot horns, etc. The triple cylinder power air pump has been improved by running the piston rod through a guide and adding a forked connecting rod, instead of attaching the rod directly to the piston by a knuckle joint, as in last year's pump. A handy stirrup pump with a folding handle is shown for inflating large tires. A useful looking syringe oiler is shown; also a foot horn with piston air pump and rubber bulb protected by a metal casing, which is the subject of a special patent; steel tanks, coppered, tested to 300 pounds, and a plumbers' pump, working up to 230 pounds pressure by hand.

TWENTIETH CENTURY MANUFACTURING CO.

The line by the Twentieth Century Manufacturing Company includes lamps for every purpose, from the smallest bicycle lamp to the 8 inch automobile headlight, burning gas and kerosene oil. The materials used in the construction of these lamps are brass and steel, and rivets are used for fastening wherever possible instead of solder. A feature to which special attention has been given is the reflector. This is in all Twentieth Century lamps made of pure aluminum, highly burnished, which the makers consider the best metal for the purpose, owing to its non-tarnishing properties and light weight. The larger automobile lamps are furnished with fastenings for any desired form of bracket, with lugs and set screws to guard against shaking out on the road.

THE ATWOOD MANUFACTURING COMPANY,

makers of the "Staylit" automobile lamps, show a large assortment of oil and electric lamps for all kinds of vehicles. All the oil lamps made by this concern can be fitted for electric lights if so ordered. Improvements have been made in the detachable burners of the oil lamps, and a spring guard added to the door fastenings to obviate the possibility of its flying open through jarring.

ELWIN L. SMITH,

Boston, Mass., exhibits the I. M. C. steering check, which has already been described in these columns. The check can be geared to any desired ratio, and is stated by the makers to have been thoroughly tested out.

Annual Meeting of the American Automobile Association.

The first annual meeting of the A. A. A. was held at the headquarters of the Association, 753 Fifth avenue, New York city, at 4 o'clock on Tuesday, January 20. The president, Winthrop F. Scarritt (Automobile Club of America), was in the chair, and Jefferson Seligman, treasurer, was also present. The following clubs were represented:

Chicago Automobile Club, by Frank X. Mudd; Long Island Automobile Club, by A. R. Pardington and Frank G. Webb; Automobile Club of America, by Jefferson Seligman and J. M. Hill; Rhode Island Automobile Club, by Julian A. Chase and H. H. Rice; New Jersey Automobile Club, by W. J. Stewart; Grand Rapids Automobile Club, by C. B. Judd; Cleveland Automobile Club, by Windsor T. White; Automobile Club of Philadelphia, by B. Barthol Brazier.

The following clubs, not members of the association, were also represented:

Cincinnati Automobile Club, by Max C. Fleischmann; Massachusetts Automobile Club, by Dr. W. S. Shrigley; the Berkshire Automobile Club, by S. G. Colt.

Winthrop E. Scarritt declined a renomination as president and Dr. Julian Chase, of the Rhode Island Automobile Club, was elected to the head of the organization.

The question of deciding as to competition between amateurs and professionals was referred to the board of governors. The racing rules had been thoroughly overhauled by the race committee and submitted for adoption, but before being made public it was deemed best to refer them to the clubs for their approval. The most important of the changes refer to track rules and to the classification of machines.

The Albany Automobile Club and the Cincinnati Automobile Club were elected to membership. There were the usual yearly reports from the various committees. Following is a list of the officers elected:

President, Dr. Julian Chase, Rhode Island; first vice president, Honore Palmer, Chicago; second vice president, E. E. Schryout Reese, Cleveland; third vice president, Charles B. Judd, Grand Rapids; treasurer, Harlan W. Whipple, Automobile Club of America; Frang G. Webb, Long Island; Dr. Millbank, Albany; William J. Stewart, New Jersey; F. C. Lewin, Philadelphia; M. C. Fleischmann, Cincinnati; A. R. Pardington, Long Island.

There was a public hearing on January 19 before the law committee of the Board of Aldermen on a new ordinance for a universal speed limit throughout Greater New York of 10 miles an hour for automobiles. Jacob A. Cantor, Mr. Eno, J. C. Pumpelly, of the City Improvement Association, and others appeared in favor of the measure. W. W. Niles, counsel for the N. A. A. M., argued in favor of the amended ordinance agreed upon by the A. C. A. and the Committee of Fifty.

NOR
ENTION

[oyea Automobile Company has :d offices at 3 to 7 West Twenty- :et, New York.

Hatcher, general superintendent gner of the Packard Motor Car ', has resigned.

ated to be more than likely that on automobile manufacturers will a board of trade.

hn S. Sloan, Peoria, Ill., has re- new automobile as a Christmas om a relative in the East.

hio Motor Car Company, Cleve- e taken a lease of the ground basement of the Pythian Temple

e received a copy of the National ile and Bicycle Directory, 1902-3, by Paul Mensch & Co., 92 and lle street, Chicago.

lkhart Carriage Company, Au- l., are experimenting in building les, and expect to put them on et the coming season.

ficate has been filed with the Sec- State that the whole of the cap- 12,000 of the Buckmobile Com- ica, N. Y., has been paid.

eneva Automobile and Manufac- Company, Cleveland, Ohio, has orporated. J. A. Carter is presi- Henry Means secretary. Capital),000 to $150,000.

rt has it that the $8,000 automo- hich the late Frank J. Matthews, City, met his death on August een sold for $6,750.

ence Automobile Company, Min- Minn., has been incorporated. $25,000. The incorporators are Pence, D. Pence and John W.

offman Automobile Manufactur- pany, West Virginia, has qualified :t business in Ohio, with an office land, Edward D. Sherman as

ridges, of Carlisle, Pa., has asso- mself with R. S. Crawford, for- the Crawford Works, at Hazle- in the construction of automo- Philadelphia.

Glenberg, Cleveland, Ohio, had bone broken and was otherwise ured by being run over by Ken- tter's automobile on January 7. ter was arrested.

isville, Ohio, capitalists have the Cleveland and Warrensville ile Traction Company, with a f $10,000, to run an auto line for rs between that city and Cleve- L. Palmer is at the head of the e, and states that a committee has pointed to figure with different manufacturers as to the cost and design of the automobiles.

Considerable interest is being shown at the exhibition in the Cummings cinch tire protector, which was described in THE HORSELESS AGE some months ago. The company has opened a New York office at 68 William street.

The Motor and Gear Manufacturing Company, New York, has been incorporated to manufacture automobiles and all motor vehicles; capital, $25,000. Directors: John Lever, Jr., Inwood, and Thomas Myers and Alexander Howell, New York.

C. C. Bramwell, well known to our readers through his contributions to our columns, has associated himself with F. M. Wilson, of Selma, Ohio, and a stock company is being organized for the manufacture of a gasoline carriage of Mr. Bramwell's design.

Ten members have been secured for the proposed automobile club in Terre Haute, Ind., as follows: W. Fleming Willien, L. G. Willien, C. A. Urban, Herman C. Prox, George C. Rossell, Dr. E. W. Smith, Walker Schell, John S. Cox, Carl Stahl and A. Chaney.

The Premier Motor Manufacturing Company, of Indianapolis, has been incorporated to deal in motor cars and gas engines; capital, $50,000. The directors are Harold O. Smith, John E. Smith, George A. Weidely, Charles Bierhaus and Clarence M. Zener.

The National Motor Vehicle Company, of Indianapolis, will be represented in Chicago by the branch house there of the Cadillac Automobile Company, the Cadillac Automobile Company of Illinois, which is now erecting a commodious automobile station at 1312 Michigan boulevard.

Banker Brothers' new garage was formally opened on January 14 and a dinner at the Arena followed, at which some lively speeches were indulged in. The speakers were L. P. Mooers, A. L. Reeves, W. M. Letts, Banker Brothers' English representative; George A. Banker, Philadelphia; E. E. Schwarzkopf, Mr. Whitmore, C. J. Wridgeway and Carter L. Banker.

The annual meeting of the New York Motor Cycle Club was held at the clubrooms, 10 West Sixtieth street, on January 14. The membership was increased to seventy. The following officers were chosen: President, E. J. Willis; vice president, E. L. Ferguson; secretary, Dr. Roy; treasurer, Henry Glade; captain, Roland Douglas; lieutenant, D. D. Miller; board of governors, R. G. Betts, W. R. Pitman and H. Bendix.

We have received copies of the two volumes comprising the annual of the Touring Club of Italy, which is located at Milan, Piazzi Durini 7. The two volumes are in pocket form and aggregate over 1,000 pages. Accuracy apparently is not one of the virtues of the publication, for, to mention only an instance, under automobile clubs in the United States we find "Brooklyn, Mass.," credited with four—the A. C. of Brooklyn, the A. C. of Columbus, the Long Island A. C. and the A. C. of New England.

The Ohio Oldsmobile Company has been incorporated at Columbus, Ohio, by William S. Wilson and others.

The name of the Baldwin Cycle Chain Company has been changed to read Baldwin Chain and Manufacturing Company.

An automobile has just been completed at the Mississippi Valley Stove Works, at Fulton, Ill., the invention of a Mr. Chapman.

The Baldner Automobile Company, of Xenia, Ohio, have purchased the factory plant of the Xenia Buggy Company for $2,450.

It is reported that land is being purchased on Long Island for a track for automobile racing. Location and particulars are a secret.

Residents of Arlington Heights, Tex., are considering the project of buying an automobile to ply between Fort Worth and that suburb.

A company for the manufacture of an automobile invented by Earl Wright, of New Brighton, is being organized at Rochester, N. Y.

In Worcester, Mass., an automobile station has been established by the Worcester Automobile Company at 86 Exchange street, which was for many years Zion A. M. E. Church.

The National Motor Car Company was chartered at Dover, Del., on January 6 to manufacture motor cars and automobiles. The capital stock is $250,000 and the incorporators are from Washington, D. C.

The Packard Motor Car Company, of Warren, Ohio, have introduced a course of lectures on the construction of automobiles for their employees and also furnish a reading room for their employees' use.

W. F. Sylvester and E. B. Jones, under the firm name of Sylvester & Jones, Weymouth, Mass., have opened a machine shop, and will give special attention to the manufacture of motor bicycles and repairing of automobiles.

The Crescent Automobile Company, George E. Blakeslee manager, of Jersey City, is said to be planning the erection of an automobile station at Hudson County Boulevard and Duncan avenue, with 30 feet frontage and 70 feet deep.

In our Doctors' Number a transposition of matter occurred which credited Dr. A. J. Hodgson with parts of an article written by Dr. W. P. Hartford. The matter in Dr. Hodgson's article under "An Automobile House" and "Winter Clothing" should have formed part of Dr. Hartford's article.

A valuable property of aluminium has, it is said, been discovered by Herr A. Bernhard, of Hamburg, namely, that of being able to sharpen cutlery. Though a metal, aluminium has the structure of a fine stone, possesses a fine dissolving power, and develops during the whetting process an exceedingly fine metal setting substance greasy to the touch, while show-

ing strong adhesion for steel. The knives in a short time obtain such a fine razor like edge that even the best whetstone cannot compete with the result.

John Brisben Walker and S. A. Miles have arranged for the Good Roads Convention on February 20.

John Hickman was lodged in jail on December 21 on the charge of having given the Cleveland (Ohio) Automobile and Supply Company a worthless check for $1,600 in payment for an automobile.

T. D. Wilkin has been elected president of the Syracuse Automobile Club; H. W. Smith, first vice president; W. L. Brown, second vice president, and Frederick R. Elliott, secretary and treasurer.

The Central Automobile Company, New York, has been incorporated with a capital of $150,000. The directors are Frank Betterton, Brooklyn; H. T. Randall, East Orange, N. J.; C. J. Gleason, New York.

The Colorado Automobile Company, capital $50,000, has been incorporated at Colorado Springs. The directors are George W. Wood, M. W. Gane, Frank R. Ashley, Elvin B. Daniels and Lewis Lindahl.

Among recent Ohio incorporations is the Springfield Automobile Company, with a capital of $10,000. The directors are Clarence C. Bramwell, Frank Howell, F. M. Wilson, Thomas L. Calvert and William W. Kiefer.

The Hyatt Roller Bearing Company, of Harrison, N. J., through its secretary, Peter S. Steenstrup, will give a dinner to some of its friends tonight (Wednesday, January 21) at Mouquin's, and a box party later at Weber & Fields'.

E. J. Willis, successor to the Willis Park Row Bicycle Company, has opened up an establishment at 8 Park place, New York, where he occupies a five story building. He is sole agent for the Herz spark plug, and agent for the Orient and Merkel motor cycles and the Orient automobiles.

The Haynes-Apperson Company have opened a new Chicago office at 381-385 Wabash avenue, which will be occupied until May 1, after which time they will move into a new office building being built expressly for them at 1420 Michigan avenue. L. W. Smelser is in charge.

Louis H. Ramsey, of the Ramsey Bill Posting Syndicate, of Lexington, Ky., says that they will soon install what will be known as the Ramsey Motor Car Advertising Service. They will make scheduled trips throughout the year to over 300 cities and towns in Kentucky, Ohio and West Virginia.

The Knox Automobile Company have just acquired by purchase the entire manufacturing plant of the George A. Schastey Company. This is a two story brick building 300x130 feet. It will at once be equipped for the manufacture of automobiles, and when in full working condition it is claimed the capacity of the Knox works will be fifty machines a week.

LEGISLATIVE AND LEGAL.

No less than five bills "to regulate the speed of automobiles and motor vehicles on highways" have been introduced in the present New Hampshire Legislature.

John C. Coleman was appointed on January 13 temporary receiver of the assets of the German-American Automobile Company, 134 West 143d street, New York, against which a petition in bankruptcy was filed on September 26 on the application of Morris J. Hirsch.

Colgate Hoyt, a Wall Street broker, who was arrested on November 30 on the charge of violating the speed regulations on Jericho Turnpike, Long Island, was sentenced on January 3 to pay a fine of $20. An appeal has been filed. Mr. Hoyt stated that his automobile is not capable of a greater speed than 19 miles an hour.

Senator Johnston, of Montgomery County, will introduce a bill in the Indiana Legislature to govern the speed of automobiles, especially on country roads. It is reported that the bill will provide for a speed of 4 miles per hour when within 150 yards of approaching horses until passed; and that each machine must be numbered on the rear and registered with the county clerk. Violations will be punishable by fines from $5 to $100, or imprisonment for thirty days, or both.

At a meeting of the creditors of the Remington Automobile and Motor Company, at Utica, N. Y., on January 10, to show cause why the real estate of the company, encumbered by mortgages, should not be sold at public auction, the claim of the Garvin Machine Company for machinery was referred to Judge Comstock for decision, and the meeting was adjourned until January 26, in order that the project for the reincorporation of the company might be matured. The injunction granted on November 19, 1902, has been ordered continued unless creditors commence suits upon and prosecute the claims to judgment, and all further proceedings on the part of the creditors after obtaining judgment are enjoined until the further order of the court.

City Councilman Platt has introduced in the Second Branch, Baltimore, an ordinance regulating the speed for automobiles, which provides that within the territory bounded by North avenue, Broadway, the water front and Fulton avenue, automobiles shall not be propelled at a speed greater than 8 miles an hour, and in other parts of the city not greater than 10 miles an hour. Two white lights in front and one red light in the rear of each vehicle must be displayed from one hour after sunset until one hour before sunrise. The chauffeur must not leave his charge without taking precautions against accident, and must stop his machine, when requested to do so by drivers, to let other vehicles pass. The ordinance names no penalty for any violation of its provisions.

Cord Meyer on Wednesday filed notice of appeal at Mineola, L. I., from his conviction on the charge of having exceeded the automobile speed laws last December.

The Peoria, Ill., automobile ordinance introduced by Alderman Proctor on January 13 was amended after a discussion. The committee report suggested a maximum speed of 8 miles an hour anywhere within the city limits. This amendment was lost. The ordinance provided that the maximum speed within the territory bounded by Fayette, Glen Oak, down Main to Perry, to Franklin, to Adams, to Cedar, to Washington, to Chestnut, to Water, to Fayette, should be 8 miles an hour, and outside of this territory and within the city limits 12 miles an hour. At the instance of Alderman Proctor this was subsequently amended to read 15 miles an hour. Each machine must have a number, of aluminum figures 4 inches high and 2½ inches wide, to be furnished by the city clerk. The chauffeur must also deposit a letter with the clerk, and pay a license of $1 per year. An amendment was also passed allowing the owners to select the quality of the figures to be used, subject to the approval of the city clerk. The ordinance was passed.

It is reported probable that the case of Louis Lichtie, the automobile owner, of Toledo, Ohio, who was arrested on a charge of having operated his machine at too great speed on the streets, will be taken up by the Toledo Automobile Club and fought through the courts.

Boston Dealers' Association.

Boston dealers have organized the Boston Automobile Dealers' Association and elected the following officers: President, Kenneth A. Skinner; vice president, W. E. Eldridge; secretary, C. I. Campbell; treasurer, A. P. Underhill. It was decided to hold annual meetings on the third Tuesday in November and monthly meetings on the third Tuesday in each month. The dues were fixed at $5 per annum. W. E. Eldredge, F. E. Randall and C. C. Reed were constituted a permanent show committee. The week beginning March 16 was thought the most suitable for holding the show, and that bicycles should also be exhibited. A committee, consisting of C. H. Lowe, Harry Fosdick and J. A. Meadman, was appointed to confer with the Automobile Manufacturers' Association, to get its sanction for the show. Harry Fosdick, C. J. Coburn and J. W. Dingley were constituted a permanent legislative committee, and the chairman reported that he had learned that the Massachusetts Automobile Club would co-operate with the association in its efforts to prevent the enforcement of adverse legislation.

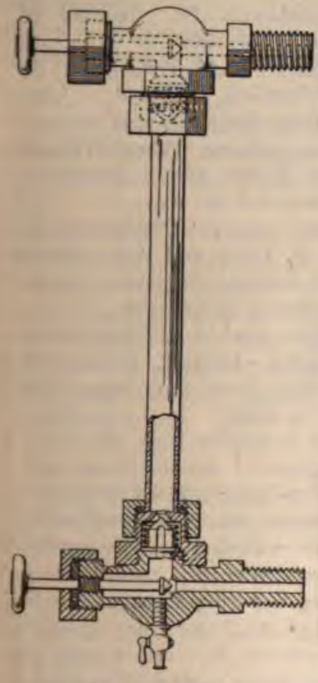
MOTOR VEHICLE PATENTS..

United States Patents.

718,228. Water Gauge for Steam Boilers.—Fridolf Strandberg, of Bruno, Minn. January 13, 1903. Filed May 16, 1902.

The invention provides means insuring automatic closure of the communication of the gauge tube with the boiler in the event of the former becoming broken; communication with the boiler is positively closed by hand independently of the automatic closure to cut off water and steam admission to the gauge and permit the withdrawal from the latter of water, including that of condensation, preparatory to the removal of the damaged tube and the substitution of a new one.

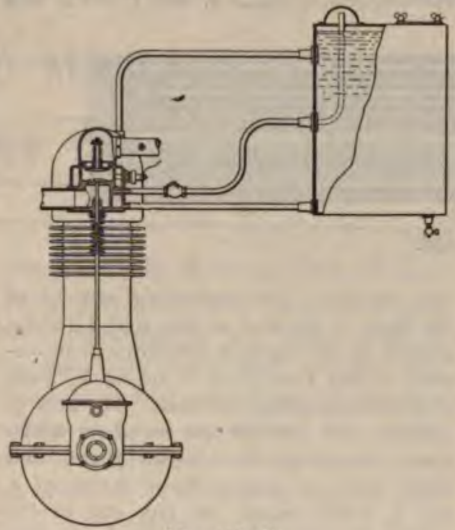
The invention comprises generally head and base members of the gauge, each having an inner horizontal tubular extension threaded for connection with the boiler and containing a passage leading to a valve chamber within its member, said chamber having an aperture opening into the end of the gauge tube of glass, the aperture being contracted by a spring adjusted valve as to variably regulate the communication betwen the interior of the tube and the boiler, but positively close said aperture upon a diminution of pressure within the latter, as would be occasioned in case of breakage. A hand operated valve and petcock interposed between the automatic valve and boiler serve for the positive interruption of boiler communication and withdrawal of water from the gauge.



No. 718,228.

718,482. Cooling Means for Explosive Engines.—F. A. Law, of Hartford, Conn. January 13, 1903. Filed June 26, 1899.

One object of the present invention is to prevent the ill effects of the overheating of the parts of the engine about the exhaust, and this result is accomplished by the introduction of steam into the chamber just outside of the exhaust valve, the temperature of ordinary live steam being so much lower than the temperature of exhaust gases that the resultant diminution of temperature very largely reduces the tendency to scaling and other ill effects referred to. A further beneficial result is accomplished by using for this purpose the steam which is slowly generated from the water of the ordinary water jacket. Such steam from the water jacket is generally allowed to escape directly into the open air, and the cloud of steam so produced is sometimes objectionable; but in the present case the steam from the water jacket is delivered into the exhaust chamber, impinging against the valve stem and the adjacent valve parts and not only accomplishes the result above referred to but is itself greatly superheated by contact with the hot hydrocarbons, and at any rate mingled with a considerable volume of hot gases, so that it is finally exhausted into the atmosphere in a practically invisible state, and does not cloud. The mixture of the steam with the hot gases has another marked advantage in that it deodorizes them.



No. 718,482.

717,000. Internal Combustion Engine or Motor.—C. E. Henriod, of Neuilly sur Seine, France. December 30, 1902. Filed November 9, 1898.

A two cycle engine, in which the conical intake valves are placed in the piston heads; the charge being drawn in through the crank case.

717,517. Engine and Driving Gear Support for Steam Wagons.—Paul H. White, of Indianapolis, Ind. December 30, 1902. Filed March 7, 1902.

717,607. Electrode for Storage Batteries. —Leonard Paget, New York, N. Y. January 6, 1903. Filed September 8, 1899.

17,608. Method of Preparing Storage Battery Electrodes.—Leonard Paget, New York, N. Y. January 6, 1903. Filed October 19, 1899.

717,609. Storage Battery Electrode.—Leonard Paget, New York, N. Y. January 6, 1903. Filed January 10, 1900.

717,610. Storage Battery and Method of Preparing Electrodes Therefor.—Leonard Paget, New York, N. Y. January 6, 1903. Filed January 10, 1900.

717,753. Hydrocarbon Burner.—William J. Lane and George Lane, Poughkeepsie, N. Y. January 6, 1903. Filed May 8, 1901.

717,760. Air Pump.—Abner A. Phipps, New York, N. Y. January 6, 1903. Filed February 1, 1902.

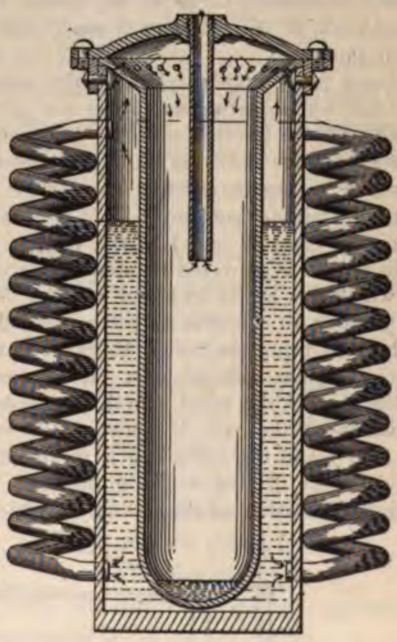
717,827. Spring Tire for Vehicle Wheels. —William T. G. Ellis, Glasgow, Scotland. January 6, 1903. Filed December 5, 1901.

717,902. Electric Igniting Device for Internal Combustion Engines.—Frank R. McMullin, Highland Park, Ill. January 6, 1903. Filed February 7, 1902.

718,045. Electrical Storage Battery.—Henry K. P. Barham, Portsmouth, England. January 6, 1903. Filed December 2, 1901.

716,467.—Boiler. Ernest G. Ofeldt, of Brooklyn, N. Y. December 23, 1902. Filed May 15, 1902.

The boiler is of the water tube type and of the particular kind in which a central standpipe is surrounded by coiled water tubes. The object of the invention is to insure the delivery of dry steam under all conditions. To this end a steam drying chamber is arranged centrally in the standpipe, communicating with the latter near the top through a series of small perforations. The steam is taken from the drying chamber through a pipe extending through the head and down into the chamber a considerable distance.



No. 716,467.

717,078. Muffler.—Chas. E. Christman,

of San José, Cal. December 30, 1902. Filed August 8, 1902.

The muffler consists of two large diameter steel tubes, concentrically arranged. The exhaust from the engine is admitted into the central chamber, from which it passes into the outer chamber; through a series of long, small diameter tubes. From the outer chamber the gases pass to the atmosphere through a series of similar small calibre tubes.

No. 717,078.

716,917. Motor Vehicle.—Hiram Percy Maxim, of Hartford, Conn. December 30, 1902. Filed October 16, 1900.

The motor is located on the frame in front of the vehicle and projects above the floor of the vehicle. A combined dash and casing surrounds the projecting part of the motor, the objects of the invention being to conceal the motor from view and at the same time arrange the parts thereof so that they will be readily accessible for inspection and repairs, also to mount the motor upon the frame so that little or no vibration will be transmitted to the body portion, and so that the alignment of the motor in relation to the other parts of the mechanism will always be kept true.

717,623. Valve Mechanism and Connected Parts.—C. C. & E. A. Riotte, of New York, N. Y. January 6, 1903. Filed April 15, 1901.

Means for partially relieving the compression when starting an engine are combined with the ignition timing mechanism. The means for relieving the compression comprise an extra exhaust valve cam J. For transmitting movement from the cam H or the cams H and J to the valve rod E an arm K is provided pivoted on a stud L, which has at its free end a roller M, the position of the arm K being normally such as to bring the roller M in the path of the regular exhaust cam H, but not within that of the relief cam J. In order to interpose the arm K between the relief cam J and the valve rod E means are provided for driving it along the stud L against the action of the spring N, which holds it in its normal position on the stud.

The igniter operating lever P is fulcrumed on a supporting arm Q and arranged with its upper end in the path of a cam R. This igniter operating cam is mounted on the shaft F, which carries the valve operating cams H and J, but at one side thereof. The supporting arm Q of the lever is pivoted on the stud L, being pushed in the forward direction of movement of the cam R by a spring S, fixed to and surrounding the shaft. The arm Q consists of a pair of side members which carry the lever P between them, and which also are connected by means of a pin T, under which the free end of the spring S engages. The lever P is given the desired backward or downward adjustment by a lever U pivoted on the stud L and bearing on the arm Q, as by means of a laterally projecting pin V which overhangs the upper ends of the arm Q.

The mechanism is so arranged that as the ignition approaches its latest point the arm K is thrown into position to bring the roller M into engagement with the relief cam J. For this purpose a fulcrum point is provided about which the lever U may move in a direction angularly to that in which it moves in adjusting the ignition point. Provision is also made for a movement of the lever G about this fulcrum point during the last operation of its movement to retard the ignition. The fulcrum point is constituted by a lug W. The upper end of the lever U is held against the lug W by a guide X, attached to the frame. The inner face of the guide is parallel with the face of the lug W for the greater portion of its length, but at one end is inclined, as shown at Y, so that as the lever U is pushed over to this end of the guide the upper end of the lever is thrown inward, and the fulcrum point W being held stationary the lower end is thrown out along the stud L, which results in a lateral movement of the arm K to bring the same into position to transmit the motion of the relief cam J to the valve rod. At the same time by the movement of the leve tudinally of its guide X the ignite justed as explained.

718,072. Running Gear for Ve Alfred S. Baldwin, Syracuse, N. Y ary 13, 1903. Filed November 23, 1

718,097. Motor Vehicle.—Charles ton, Worcester, Mass. January 1 Filed September 25, 1901.

718,122. Roller Bearing.—Alb Henderson, Toronto, Canada. Jan 1903. Filed June 27, 1902.

718,231. Motor Vehicle.—Willi Whitbread, Godalming, England. 13, 1903. Filed June 7, 1902.

718,244. Supporting Shoe for with Air Tires.—Leon Combrun, C the Seine, France. January 13, 1903 August 25, 1902.

718,324. Means for Locking the Mechanism of Motor Vehicles.— Devlin, Paterson, N. J. January 1 Filed September 18, 1902.

718,439. Cellular Rubber Tire fc cles.—Alfred Ducasble, Asnières, January 13, 1903. Filed November

718,440. Steering Apparatus for —Hans J. Elsner, Kalk, near Colog many. January 13, 1903. Filed 1901.

718,489. Secondary Battery.—Ja Madigin, Toronto, Canada. Janu 1903. Filed February 5, 1902.

718,531. Speed Regulating and ling Mechanism for Self Propelle cles.—Axel W. Sandell, Chicago, Il ary 13, 1903. Filed March 21, 1901

718,637. Secondary Battery.—Isid see, Philadelphia, Pa. January 2 Filed April 28, 1900.

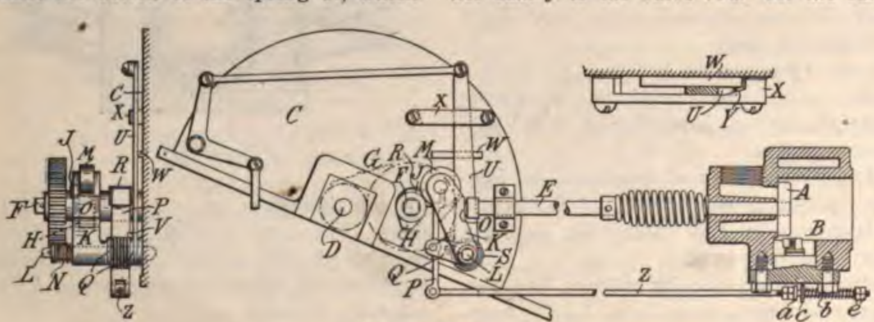
718,696. Vehicle Tire.—John S. halls, Plymouth, England. Janu 1903. Filed March 4, 1902.

718,645. Elastic Wheel Tire.— C. Lilly, Akron, Ohio. January 2 Filed December 27, 1901.

718,481. Internal Combustion E Walter L. Davis and Alfred Soa County Surrey, England. Janua 1903. Filed June 27, 1902.

718,422. Method of Manufacturi gine Cranks.—John P. Brophy, of land, Ohio. January 13, 1903. Fil tember 15, 1902.

It has heretofore been customary manufacture of double cranks and therefor to forge a piece of metal approximate required form, whic bodied an enlarged solid eccentric which was afterward turned out t the inner opposing faces of crank and the journal for the connecti This operation involved a very sl hence expensive process of turning waste of a large amount of mate well. In my improved process I imate very much more nearly the form of the crank and shaft before finishing it than was possible by th described former method, and ther fect a great reduction in the expendi time and labor and of the waste of m



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..EVERY WEDNESDAY...

Devoted to Motor Interests

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The Lesson of the Show.

Now that the Automobile Show at Madison Square Garden in this city has come to a close it can be pronounced a complete and unqualified success. The exhibitors practically without exception reported a large attendance of the most desirable class during the whole week, and many sales have unquestionably been made, while at the same time much good seed has been sown that will ripen in the future. The visitors were, on the whole, well satisfied with what they saw, and they could hardly be otherwise. The exhibits showed that many of the crudities and mechanical faults in the vehicles exhibited only a year ago had been eradicated in the interval and that the watchword of the manufacturers during the year had evidently been: "Good automobiles first; then cheap automobiles." This policy is certainly an excellent one, and one which if adhered to in the future will make the American automobile the standard of the world and insure its complete success at home.

The experience of most of the exhibitors was that the visitors demanded to be shown and explained the operating principles of the machines, and with few exceptions all had made provisions to meet this demand. On nearly every stand was shown at least a chassis and sometimes also separate engines, transmissions and other parts. The rule prohibiting the use of gasoline in the building prevented machines being shown running under their own power, but some of the exhibitors had installed electric motors by which the engines and mechanism were slowly turned over, and in one instance a motor of which sections had been cut away was thus exhibited, the various parts performing their functions the same as in normal operation. It need hardly be said that the stands at which machines were shown in motion were usually surrounded by a crowd.

A most gratifying feature of the Show is the unprecedented financial success, eclipsing by far even that of the late Paris Exposition, according to the statement of the president of the Manufacturers' Association.

The National Association of Automobile Manufacturers certainly acted wisely two years ago in restricting its patronage to two annual shows, for if the multiplication of shows which then threatened had been allowed to go unchecked the Madison Square Garden event could hardly have been the success it was. But what is to be done in the future? Some change seems quite necessary, for with a continuance in the growth of the industry at the present rate the prospects are that next year the demand for space at the Madison Square Garden Show will be far greater than can be met. Besides, the basement is not well suited to the exhibition of complete automobiles. The numerous local shows this winter indicate that shows generally are a paying method of advertising automobiles. It has been suggested that the exhibition should be restricted to complete automobiles, and parts and sundries be excluded, but this would hardly solve the problem—first, because it would be unfortunate to separate exhibitions of complete machines and of parts and then because the galleries, in which the parts exhibits are located now, are no more suited to the exhibition of complete autos than the basement. It is beyond question that greater show facilities are wanted for next year. But how are they to be obtained? Would an additional "recognized" show at some important automobile centre outside of New York and Chicago solve the problem?

The American Automobile Association and the American Motor League.

During the past week the two national organizations of automobilists, the American Automobile Association and the American Motor League, both held their first annual meeting in this city, which suggests some considerations regarding their relative aims and scope. It will be remembered that both organizations practically began their existence at the same place and date, in

Chicago during the last Automobile Show there. The organization of the American Motor League really dates back to the beginning of the motor movement in this country, but prior to the reorganization at Chicago the League for a long time existed in name only.

When it was proposed to reorganize the American Motor League—the association of clubs being then already under consideration—we maintained that there would not be room for two national organizations; that sooner or later strife would spring up between them, with the result that the energy which should be spent in furthering the cause of the automobile and defending it against outside attacks would be wasted in internal friction. That there has been no clash has been due mainly to the great difference in power and influence of the two organizations which would have made the result a foregone conclusion. The weaker organization has wisely abstained from fields where it might have come in conflict with the other one.

Since the American Automobile Association admits clubs to membership only there would seem to be room and need for an organization taking care of the so called unattached owners. Looking at the subject from this standpoint the field certainly is wide enough for two organizations. Where the trouble comes in is when the field of activity to which each organization shall confine itself is considered. If one of the organizations contents itself with a recluse existence the two may get along together serenely, but the question arises, What good to the movement is an organization the sole activity of which consists in holding a meeting annually and electing a new set of officers?

The adhesion of the unattached automobilists would give the American Automobile Association far greater prestige and power for advancing the movement, while under the present conditions the moral power arising from the great number of these unattached owners is practically lost to the movement. It ought not to be impossible to devise means by which the association could avail itself of the support of the unattached owners. Such a plan ought to be considered. It seems reasonable to suppose that the Motor League, recognizing that under existing conditions its efforts will always be hampered, would welcome any suggestion by which the individual owner may receive consideration from the American Automobile Association.

California for Winter Touring.

We have repeatedly printed in our Communication Department letters from Easterners in Southern California who spent their winter months in that delightful region. It also appears that the recently organized Los Angeles Automobile Club is composed mainly of automobilists from the East residing temporarily in that city. We are glad to give space in our columns to such communications, as they tend to encourage automobile touring and bring to the notice of a large circle of readers the natural beauties and attractions of various parts of our country, which are only too often underestimated in comparison with those of European resorts.

Little encouragement has so far been given to touring in the United States, except by the railroads, but now that the automobile has largely extended the possibilities of touring in districts devoid of railroad communication the subject should receive a strong impulse. It may safely be predicted that Southern California will in the near future gain immensely in popularity as a winter resort for automobilists, for the reason that in addition to its other attractions it offers that of good roads upon which automobiling can be enjoyed to the fullest extent.

Great efforts are being made in a number of European countries to attract the foreign traveler and every inducement is offered him. Traveling should receive the same encouragement in the United States, for a reason which for France was recently stated in an address by M. Ballif, president of the Touring Club of France, who said:

"We are accused of jingoism; but the Touring Club should be jingoistic, for it is its aim to develop touring in France and not touring in other countries. Why should we continue to make presents to foreign countries? The motto in industrial life is, 'Everyone for himself.' Now the industry of travel is a very prolific source of wealth and we want to retain possession of it, and not carry our money into foreign countries as long as our France has need of it."

Oppressive Regulations Proposed in New Jersey.

By reference to the Communication Department in the present issue it will be seen that a bit of very objectionable automobile legislation is about to be attempted in the New Jersey Legislature, and that the measure has caused a considerable stir in the automobile circles of that State.

The Governor of New Jersey in his recent message referred to the automobile question as one urgently demanding legislative attention. This can hardly be denied, in view of the multitudinous conflicting local regulations which have been enacted in various parts of the State during the last year, but certainly no such measure as that now proposed is called for by the conditions. It is to be presumed that the passage in the Governor's message was intended to pave the way for the bill which has now been introduced.

With regard to the provisions of the bill, as outlined on another page, a 15 mile an hour limit in the free country is entirely too low and would, if rigidly enforced, greatly limit the benefits to be derived from the use of automobiles. The speed limit fixed by New York's State law, 20 miles an hour, which has now been in force for about a year, has not been found too high by considerations of public safety, and there is absolutely no reason why the limit should not be placed just as high for the roads of New Jersey, which are in general less hilly and better paved.

Even more objectionable than the speed limit is the method of licensing proposed which takes the form of a method of special taxation. In New York State the operator of an automobile pays a fee of $1 for which a license is granted him that remains valid indefinitely. A list of automobile owners and operators is kept by the Secretary of State, the vehicles are required to carry initial plates, and these provisions so far seem to have proved all sufficient to properly regulate automobile traffic. The attempt now made in New Jersey to burden the automobilists with special taxes and to subject them to various annoyances demands concerted opposition. It is to be hoped that the various automobile clubs in the State will join hands in fighting the measure and we believe the subject is one of sufficient importance to call to the attention of the A. A. A.

Assemblyman Scovel, of Camden, has introduced a bill in the New Jersey Legislature providing that a board of examiners, consisting of five members, be named by the Governor to examine automobilists as to their fitness to operate machines; that an annual license be issued on payment of $5; that speed be limited to 15 miles an hour; that anyone found operating a machine without a license may be arrested and fined $50 or thirty days' imprisonment, or both; that anyone refusing to exhibit his license may be fined or imprisoned.

ritical Review of the Show.

By Albert L. Clough.

hird annual Automobile Show was liant expression of the exuberant f a very great industry which has yet quite "found itself" or settled the humdrum methods and prosaic, practical, standards of older and rmly founded lines of manufacture. t does, automobile shows, if held at not be so interesting, for maturity so interesting as youth.

was a glitter of brass horns and its and a sheen of richly varnished which, together with the brilliant signs, almost made one forget the s and bad air of Madison Square

one had wandered about a little ame adequately dazzled, the ques- likely to arise as to who was going and operate the enormous number cylinder touring cars, ranging from horse power, which the manufac- eem preparing to produce. Judging pearance, a large fraction of the turers are pinning their faith to ensive type of car, as their most nt product. To some people it is ious how these high powered vehi- find a sphere of usefulness war- their cost and complication, now ed ordinances are practically uni- Perhaps it is not claimed that they sphere of usefulness at all. The who buy these cars must, it seems, e resigned to "tying up" a lot of e power equipment or they must ate law breaking. Let us hope not r alternative.

here will be a certain demand for igh powered multi-cylinder cars, re supremely "smart" and modish, ubted, but whether the demand will cient to "go around" among the anufacturers who claim the ability uce them may be open to serious At any rate, that is the manu- s' business and one must not be- ore" simply because of the lack of buy such a car or the lack of a de- own one, even apart from financial ations. These four cylinder cars nish jobs to many a needy chauf- d thus aid in the distribution of What an amount of touring is epared for!

facts concerning these touring cars y noticeable. First, they are all, certain important exceptions, of the Continental type, copied abjectly ccessful French cars; and, second, very closely standardized; so that number of manufacturers are pro- practically identical product. The occurs to me that if this type does t with the expected universal de- this country there will be an enor- ount of capital uselessly locked up ns, special tools, castings and other Some skeptics have expressed the belief that two or three concerns could supply the demand for this type and that much capital is put at risk by so many manufacturers fitting up for the work.

One may readily write a general specification which will approximately cover this type of car, and apply almost equally well to a considerable number of makes. It might read somewhat as follows: Frame well constructed of steel channels or of wooden sills steel reinforced. Springs, semi-elliptic in front and full elliptic in the rear. Steering pivots ample and well hung with worm and wheel or pinion, and sector steering gear operated by a substantial column capable of being thrown out of the way of the occupants. Engine of the vertical twin cylinder type, located upon the extreme front of the chassis—four cylinders being preferred. Cooling, by means of cellular radiator, located immediately in front of engine, fed by positive circulating pump geared to the engine, and air cooled by means of propeller fan belted to engine shaft. Ignition, by means of the contact or jump spark, with an apparent tendency to return to the former—the mechanical generator not yet seeming to be generally preferred over the battery. Engine control, by means of a governor of the "throttling," not the hit and miss type, arranged either to be cut out by the lever on the steering wheel or to have its spring tension varied thereby. Spark control manual, by means of lever on steering wheel. Carburation, by means of single carburetor of the float feed atomizing type. Throttling of the charge, by means of a butterfly valve or by limiting the play of the inlet valves. Valves accessibly located, and contained in readily removable cages. Inlet valves in some instances mechanically operated. External flywheel of large dimensions, containing cone clutch of generous proportions, operated either by pedal or by lever. Sliding gear transmission perfectly encased, giving three forward speeds and reverse, and direct drive on the high speed. Brake pedals, clutch pedal and lever and gear shifting lever, provided with safety interlocking devices to obviate mishandling. The transmission to the driving wheels shows no unanimity of practice, and may be by flexible shaft to bevel gear differential on live axle, by means of single chain to live axle or from differential in gear box by separate chains to rear wheels. Wheels of about 34 inches diameter, of the artillery type, and equipped with roller bearings and 4 inch tires. Hub brakes on both rear wheels and brake on transmission shaft. The lubrication is carefully taken care of in these cars, and is by means of mechanical or at least magazine lubricators. Grease cups, too, are freely used. These vehicles have readily removable bodies, and capacious and comfortable seats, but in some of them the shape of the bonnets is hideously box-like and ungraceful. They carry at least three huge headlights and two horns, and some of them sport a small acetylene gas plant. They are highly impressive, and really seem to be generally well built and strong, without any large amount of waste metal.

Of course, there are some touring cars or road carriages of touring capabilities constructed upon time honored American lines. Three cars of this type come to mind as good examples. They carry large horizontal opposed cylinder motors of slow speed, controlled by a simple method of throttling, and make use of transmission systems which cannot be generalized. The bonnets, which are of particularly neat lines, contain the various tanks. For smoothness of operation these cars cannot be surpassed, it is believed, and they are thoroughly up to date in their appointments. Engine accessibility is adequate in these vehicles, considering the simplicity of their motive power. American road carriages of full touring ability and equipped with single cylinder engines are not absent from the show.

The line between the touring car and runabout was very sharply drawn in this Show and reminded me that there are social distinctions in the automobile world. The runabouts are the "plain people" of the motor world, and generally do not make so much noise or carry so much jewelry in the way of lacquered brass. Most of the manufacturers still make a runabout, but they seem to be rather ashamed of it. Some of the exhibitors confine themselves to producing vehicles of this class, and will probably be in business for some time yet. These little vehicles (as we are compelled to call even the full powered ones now) make very little copy for the daily press, but are sturdy and practicable vehicles of everyday utility, can be manœuvred in a street of ordinary width, and may be driven by their owners. Most of them are capable of touring anywhere under legal conditions as to speed, but one or two of them are of such small power as to be hardly more than toys when used on country roads. The horse powers range from 4 to 8 approximately, and American methods of construction are universal.

The typical American runabout, as seen at the Show, may be roughly described as follows:

Engine, single cylinder, horizontal and of moderate speed, with throttle control, and manual spark advancer or automatic spark governor. Jump spark or contact spark ignition from battery or generator. Valves in many cases mechanically operated. Planetary transmission, giving two forward speeds and reverse. Cooling generally by pump and radiators. Simple lubrication. Wheel steering in most instances now, although the lever is retained by some well known makers. Float feed carburetor. Long wheel base, with good springs, and wood or tubular wheels, although the suspension type is not entirely discarded. Gasoline tanks of good capacity and running gear much strengthened

over previous seasons. It is probable that the weight of the average American runabouts has increased. The amount of material in some of them has nearly doubled since the beginning of their development—some cars which used to be proudly rated at 750 pounds now tip the scales at 1,500 or 1,600.

One thing which was noted with the greatest pleasure at this Show was the candor of the manufacturers. Most of the exhibitors showed the chassis of their vehicles, with body entirely removed, so that every part of the mechanism was exposed to view. There were many who showed their engines dissected, laying bare the construction of cranks, pistons, valves, and indeed all the important parts. One exhibitor showed a longitudinal section of his engine, and used a small electric motor to turn it over, thus showing all parts in action.

Cylinder dimensions were cheerfully given out, and even figured on placards. Verily, Isis is unveiled, and the pig is out of the poke. Investigation of all kinds apparently was courted. There was a most creditable absence of "fakes" from among the exhibits; in fact the increased intelligence of the automobile public would not give such things a hearing. The use of the automobile and the effect of these shows are performing an amount of mechanical education which cannot be overestimated. Women are sharing with men the advance in mechanical intelligence.

There were very few novelties at the Show, and this is not to be regretted, as novelty is too often synonymous with "freak." The motor propelled buckboard, however, made its début, and probably will find a certain field of usefulness similar to that which it has long enjoyed in horse drawn practice. The lack of novelties was far more than compensated by the evidences of careful attention to details and minor points of design, and by the progress toward standardization, which was so gratefully apparent.

Engines showed very marked improvement. The use of aluminum or alloy crank cases and sheet metal or separable cast metal jackets has greatly reduced the weight without any corresponding sacrifice. The employment of integral cylinders and heads and of ground joints and valve housings screwed in instead of attached by flanges has well nigh eliminated that unmitigated and inexcusable nuisance, the asbestos gasket of "blowing" proclivities. Exhaust valves, inlet valves, and even contact spark plugs are now carried in separable and interchangeable cages which screw into place or fasten like gun breech blocks. The coring out of exhaust and inlet passages in the heads renders unnecessary the disturbing of pipe connections when valves are removed. Some attention is now paid to connecting rod and even wristpin adjustments and main bearings are more liberal. One notes with thanksgiving that very little is seen of enclosed flywheels, but that flywheels are being very liberally designed.

Cooling systems present some points of interest. Radiators of the cellular fan cooled type are strongly in evidence among the touring cars. Radiators of this form must be excessively expensive to manufacture and must be prone to develop leaks. Some people think that a circulating pump is needless complication. What of the combination of a pump and a fan? It is possible to arrange an interesting series of cooling systems from among the exhibits. Beginning with the four cylinder motor which cools without mechanical aid, we next have the hedgehog air cooler with fan, then the thermo-siphon water cooler without mechanical aid, then the flanged pipe radiator with circulating pump, and, lastly, the cellular radiator with circulating pump and air fan. Where, in this series, does ultimate practice lie?

The majority of all the vehicle motors are cooled by means of flanged pipe radiators, fed by positive circulating pumps, which are much more reliably driven than in the past.

It is interesting to note that there is a decided tendency to revert to the contact spark method of ignition. Quite a number of the four cylinder touring cars are sparked by mechanically operated igniters. Whether this lack of confidence in the jump spark is due to inherent and irremediable defects in the system or whether it has arisen from the miserably cheap, frail and inadequate contact devices, coil vibrators and plugs with imperfect contacts, which have been offered commercially, and from the use of lamp cord and the d. p. tack in wiring the high tension circuits, one can only conjecture. It seems passing strange, however, that mechanical sparkers should be so enthusiastically adopted upon multicylinder motors, as the multiplication of moving parts necessitated is so great. One would naturally suppose that the advantage of the contact spark over the jump spark would be less as the number of cylinders is increased. Of course, the cost of separate jump spark coils for four cylinder motors is considerable. It is hardly to be believed that the jump spark has been fairly weighed in the balance and found wanting. With better attention to cylinder lubrication, with larger and stronger plugs better located in the combustion chamber, with liberal contacts of suitable metal throughout the electric circuit, with wiring fit for a high tension distribution, and every detail attended to with scrupulous care, it is hard to believe that the jump spark cannot be made to give a splendid account of itself.

The contact devices for jump spark ignition show general improvement this year. They are more substantial, the springs stronger and the contacts more massive. The flimsy little devices put together with 6-32 screws and mounted on red fibre bases, with no protection from dirt, were not in evidence in this Show. Wiring also shows an improvement, although there is too much use still made of soft rubber tubing, which everyone must know is peculiarly vulnerable to oil, and by age hardens to an absolutely brittle condition, in which it is perfectly useless as insulation. High tension cables are still allowed to come into contact with metallic parts, which is entirely inexcusable. Contacts of cables with their binding screws are now made in some cases by means of spring clips, which insure a certain flexibility and immunity from danger of breakage, and still afford a firm electrical connection, which is instantaneously removable.

There seems to be no universal adoption of mechanical generators as yet, and dry batteries still appear to be holding their place.

The transmission systems of the heavy cars are largely of the sliding gear type, well encased and with bearings well thought out. In these cars cone clutches of very liberal bearing surface are embodied in the flywheels. There is a general adoption of safety devices to obviate possible damage due to a careless shifting of the mechanism. Three speeds forward are practically universal among the large cars. The runabouts generally adhere to planetary transmissions. While there are a goodly number of the heavier vehicles which employ flexible shafts and bevel gear drives, this practice has by no means displaced the use of the chain. Live rear axles are the rule on all classes of vehicles.

One thing which favorably impresses the critic is the close attention paid to the matter of brakes. Upon the larger cars the brake upon the differential is a thing of the past—substantial rear hub brakes have taken its place. There is always another entirely separate brake acting on the transmission shaft.

It may be said that the wire wheel has become obsolete upon all but the very lightest rigs, and in these an option of wood or tubular wheels is generally given. The artillery wheel has fairly "won out," as it deserved to do, and another bicycle feature has been relegated.

The diameter of the wheels has rather increased, especially those of the larger cars. Thirty-four inch is not far from the average in this class, and there are not so many 28 inch wheels, even among the runabouts. It must be apparent that a long wheel base is at last universally recognized as the essential condition of easy riding properties and durability, for there are almost none of the short rigs, with stiff tubular frames, which figured disastrously in the earlier stages of the industry. In fact tubular frame construction appears to be generally discredited in gasoline cars, and the steel girder or metal reinforced wooden sill frame construction seems to be accepted practice. Some of the oldest and best American manufacturers, however, still retain characteristic forms of running gear construction, which must

possess merit of their own. Very little is seen of tiller or side steering, although some of the manufacturers of light cars still persist in it. The steering wheels are generally larger and more comfortable to handle, and less in the way of the passengers.

One can judge very little of the workmanship of the vehicles without dissecting them more than is possible in an exhibition. Most of the parts where good workmanship is most essential are normally hidden from view, but it is to be believed that the standard has been raised very creditably. As to the finish of the cars as a whole, there is very little left to be desired. The improvement in this regard is perhaps the most noticeable thing to the superficial observer. The colors are not glaring, but are rich and full, and the design of the bodies is most graceful except in the cases of a few manufacturers, who are new in the business.

Business vehicles were disappointingly scarce among the exhibits, and this is perhaps the only seriously regrettable feature of what was indeed a magnificent gathering together of the fruits of the highest inventive and mechanical geniuses of the world, as devoted to the solution of a great problem, fraught with all kinds of possibilities of human good.

The Show and Its Lessons.

By Harry B. Haines.

The third annual Automobile Show which closed on Saturday evening after a phenomenally successful run at Madison Square Garden clearly demonstrated the fact that although the French have the glory of having been pioneers in developing the practical automobile the Americans have the credit and the dollars resulting from perfecting it.

The foreign machine with all its masterly mechanical phases and its carefully worked out details was shown to be none superior to the high quality American machines of the best manufacture in ease of operation and control, beauty of lines, durability of construction, workmanship and general accessibility. This is in itself no small achievement, for with the cheaper labor at their command the French manufacturers have the opportunity and ability to incorporate a great amount of careful hand work into their cars, and it is this alone that has won the foreign machines their reputation and insured the good results they have almost invariably given.

It was a notable fact that all the American manufacturers had in their 1903 models given more care to the smaller details of machinery finish and used infinite pains in completing the parts that in last year's machines were hastily gone over. For instance, in a great many cases every nut on some of the cars was case hardened, as was the end of every bolt, in order to prevent any marring or cutting when wrenches are used. And again, in some of the higher priced makes the bearings in the transmission case, which ordinarily are not remarkable for their careful finish, were scraped most carefully and finished by hand, showing that the makers are trying to turn out a car that is just as pretty inside, where it is hidden from view, as it is on the smoothest portion of its paint and varnish coat.

It is such effort and practice as this that instills confidence into the buying public and that will insure success.

It is gratifying to learn that there are at least a few makers who desire to turn out a car that will run for more than one season without being rebuilt and practically bought over again in new parts purchased of necessity to replace old and defective ones. As soon as the American manufacturer awakens to the full realization of the fact that there is no saving in cheap and inferior material, just so soon will the American automobile equal and excel the French and other foreign machines. The American vehicles are equally as good as the imported ones, equally as well designed and mechanically planned, and it only remains to put equally good material into them and as good workmanship to make the motor car that bears the stamp U. S. A the standard and the model of the world.

What is, perhaps, one of the most salient features in the construction of the 1903 motors was the use of aluminum in places wherever possible, to reduce weight and still not take away any necessary strength. The plan of reducing weight wherever feasible is certainly a good one, for the less actual dead load of machinery and body a motor has to drag along the more power it has to expend as propulsive energy. In no instance, however, as far as was noticed was strength sacrificed to save weight, and some manufacturers went to the other extreme in producing springs, axles and running gears with an almost exorbitant amount of surplus strength.

One of the hits of the Show was undoubtedly the air cooled motor, and three styles of vehicles so propelled were shown. The interest in these, and particularly in that vehicle with a forced draft radiation, was remarkable. It was clearly demonstrated, however, that in this particular type at least America stands in a class by itself, unapproachable and to date unassailed.

That the thousands of visitors at the Show were doing something besides looking at the machines exhibited and asking curious questions was clearly shown by the placards placed prominently about most of the cars stating that they had been sold and giving the names of the purchasers. There was scarcely a single concern that did not dispose of at least the machines exhibited, while many concerns booked dozens of orders, invariably securing cash deposits or cash payments for at least 25 per cent. of the purchase price.

American Cars Abroad—A Duryea in Old Japan.

The names of many well known motorists appeared on the placards, showing the purchases made by them in all sorts of the three propulsive powers exhibited.

The lock nut and cotter pin method of fastening nuts likely to jar loose was also much in evidence, and from the precautions taken it is safe to predict that the roads will not be so liberally strewn with automobile nuts, bolts and parts during the coming season as they were last year. The agitation among users and through the trade papers for gear driven pumps for water circulation evidently bore fruit, and it was noticeable that most of the friction driven pumps had disappeared, and this cause of holdup will not be so evident in this year's endurance contests.

Automatic lubrication and a liberal dis-

tribution of grease cups around bearings that were formerly hidden away, to be recklessly squirted at with a round nosed oil can which seldom was long enough and which scarcely ever hit the spot, attracted attention, and this, coupled with the almost universal practice of furnishing more protection against dust and dirt, is going to insure longer life to bearings and motors and considerably less work for the repair men.

The exhibits of the numerous new concerns that have entered into business during the past year or six months were viewed with attention and interest, but the buyers were a bit shy and were inclined to use the time worn pugilistic phrase of "go and get a reputation." Not a few of these new concerns had directed their energies toward producing a light weight, medium priced and even cheap single cylinder tonneau touring car.

It was evident, however, that the old time concerns, whose products have been widely advertised through the trade papers and whose machines are standing up under everyday use, were doing the lion's share of the business. There were many who were willing to believe in a new thing, and it is to be hoped that the new manufacturers are prepared to make a special effort to convince the public that they are deserving of the reliance placed upon their product. There is an almost unlimited field for any good, honest built machine on the American market, and the milestones of failure already strewn along the road of automobile manufacturing, as new as it is, speak louder than words of the folly of pursuing any other course. The public can easily be fooled for one season, may perhaps be fooled for two years, but they will finally awaken, and when the reaction sets in it is as swift and as positively sure in its results as suicide and death itself.

The tendency to do away with the troublesome and annoying features of the 1902 and earlier models was apparent in the precautions taken to improve the sparking systems on the various machines. It is a conceded fact that 50 per cent. of all automobile troubles arise from the sparking apparatus, and it is self evident that with this cause of annoyance removed the auto will be much advanced on the road toward perfection.

The flimsy connections and thinly insulated wires of past years have given way to good sized cables and connections heavily insulated, and in many cases run through rubber cases to insure against loss of current and short circuiting in wet weather. The copper terminals for wire connections were also much in evidence, and lock nuts were to be found on spark plug connections to prevent the many stops which in the past have been occasioned by the spark plug wire dropping out of place or breaking at the end. The dynamo and magneto sparkers are now a regular equipment with many standard makes, and storage batteries are only used for starting the motors. In many cases the dynamos are so constructed that they cut in automatically after the engine has reached a certain speed, and switch off again when the motor stops.

Numberless precautions have been taken to prevent spark breakers from being interfered with by dirt and dust, and from spark points becoming fouled by the use of too much oil or too rich a mixture.

It is safe to say that the study and thought given to this one particular part of automobile construction will result in much good, and the roads this season will not be as thickly strewn with belated wayfarers held up for spark troubles as they were last year. Much comment was occasioned last season over the very unworkmanlike jobs of wiring that were put into some machines, and particularly into the light runabouts, and it is gratifying to note that the men prominently connected with the industry are not bigoted enough to think that they knew it all, and are open to suggestion when it means an improvement that is worth considering.

There is little doubt but that the manufacturers secure more good and valuable information from the narrations of the experiences of users of their particular make than from any other source, and they should be the foremost advocates of the spreading of this knowledge broadcast over the land, so that each user's repair bill and breakdown will be a moral lesson to his fellow autoists, calculated to save them money and keep them out of trouble. "The man that owns one" is in a position to experiment every day, and what he finds out through the rigid test of actual service is worthy of the highest consideration.

That the highest priced machines are not all imported was shown at one booth where an American concern had on exhibition a four cylinder car selling at $7,000. There was nothing peculiar about this except the fact that they advised all would be purchasers against buying their machine of this type unless they were financially able to employ an expert mechanic to keep it in order for them or were willing to make a deep study of mechanics.

This, of course, was a very fair proposition on their part, and forewarned is certainly forearmed, but the ordinary man does not want to buy a machine if he has to buy an expert chauffeur with it.

The agent of this particular type argued that if the automobile was to be the vehicle of the future there was no more reason why the owner of it should drive the machine himself than there is that he should sit on the box of his brougham. He argued that it was all right if a gentleman wanted to drive his car, but if he could afford a high priced machine he should afford a man to do the dirty work on it, and should no more think of cleaning a spark plug than he would of fixing a trace or a bridle. He stated that the majority of persons had not favored the high priced car and regretted the fact that the American of today wants to put on plenty of style, but objects most seriously to paying very much for it.

Taking the Show as a whole, with its steam, gasoline and electric types, it was undoubtedly the exemplification of what is best in the leading minds devoted to automobile construction, and if the improvement at the 1904 Show is as marked as it was at the exhibition just closed it will then be an assured fact that the perfect automobile is not a dream, but a practical reality to be seen and to be handled before the present decade is over.

N. A. A. M. Annual Banquet.

The National Association of Automobile Manufacturers held its annual banquet at the Waldorf-Astoria Hotel on Friday evening, January 23. About 225 persons attended. Winthrop E. Scarritt acted as toastmaster. President Davis, of the association, preluded the toasts with a short address to the assembled manufacturers in which he pointed particularly to the brilliant success of the show which was about to come to an end, which would net in profits, he said, $40,000. The toastmaster thought that the world in its evolution became prepared for certain great inventions only at definite periods, and that it had only recently become prepared for the automobile. He ventured to say that it was a far greater advance from the ox of the ancients to the automobile of today than from the latter to the airship of the future. And, growing prophetic, he predicted that the child of some future age would wake up in the morning seeing as many sails heaving in the sky as we now see on the water.

Among those who responded to toasts during the evening were Jacob A. Cantor, president of the Borough of Manhattan, and Hon. John S. Wise, of Virginia, the former responding to the toast, "The City of New York," and the latter to "What Lawyers Hope for from Automobiles." Both naturally indulged in some jokes at the expense of the automobile and the automobile manufacturers, but expressed the opinion that the automobile was bound to become a most important factor in our civilization. Mr. Cantor referred to the good roads movement, and voiced the opinion that the impulse which had been given to road building through the efforts of automobilists would not die out until every State in the country had a complete system of improved roads. The remarks of the Hon. John S. Wise were mostly of a humorous character.

F. L. Smith, of the Olds Motor Works, responded to "How to Sell an Automobile," and T. C. Martin, editor of the *Electrical World and Engineer*, to "Electrical Matters Pertaining to Automobiles." Toastmaster Scarritt brought out a closing toast to the success of the American team in the Gordon Bennett Cup race, and two of the prospective contestants in this event made brief addresses.

E EXHIBITS.

GASOLINE.

OLDS MOTOR WORKS.

epartures from their standard run- the Olds Motor Works exhibited , driven from the inside, and a 10 ower tonneau. A chassis with sec- the motor and crank case cut away the complete cycle and working f the engine was at all times the of an interested crowd. Women umerous among the curious who to learn just what "makes the go 'round," and it is exhibits of this at are educating the public in me- and the principles of motor con- n.

runabout showed very few changes st year's model, the substitution of simpler and what is claimed to be efficient carburetor for the old type hragm carburetor being the only departure. A sliding diaphragm worked by a foot pedal is used re. Air for the mixture is taken e side of the body through a sys- small holes to insure an air supply m dust.

front and rear axles are now rein- by trusses, which were found neces- the exceptionally poor roads on many of the vehicles are being used. oupé is a very attractive and novel , especially designed for doctors to operate their own cars through ls of weather. It is built on the d chassis, the gears, however, being their driving ratio to allow for the in body weight.

onneau is a two cylinder car with tal opposed cylinders, developing 10 power. The transmission and the n of the car are similar to the small- the only difference being that all equiring it are made heavier to e increased strain due to the higher ower. A novel feature is embodied body design, the tonneau being en- rom the side instead of by a rear This is the only vehicle so far seen s this mode of entrance, the desir- of which is realized when it is seen e can leave and enter from the curb of a muddy street.

onneau is removable and allows of nent by a flat touring back fitted for a large hamper or luggage.

company have increased their plant rably and are figuring on doubling st year's output.

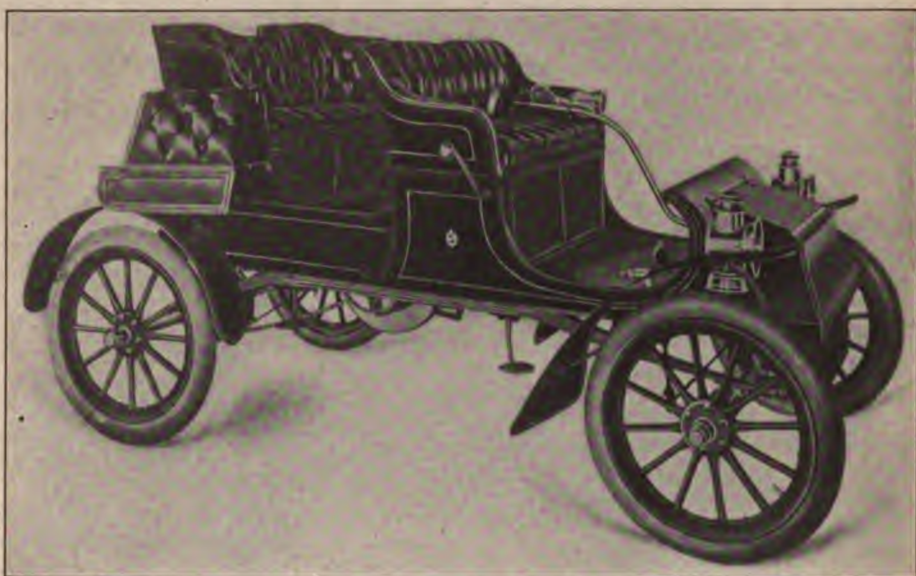
THE AUTOMOTOR COMPANY.

Automotor Company, of Springfield, were in the Show with two ton- rs of 12 and 18 horse power, having d four cylinders respectively. The nder car contains very few depart- ures from last year's model, whereas many improvements have been added to the larger.

The company's new "Diamond" radiator is being used on the four cylinder car and promises to prove a most effective cooler. It consists of very thin copper sheets, about No. 28 gauge, folded over and with the two loose ends soldered together. This forms a series of flat tubes through which the water percolates, cooling as it descends from the top of the coil to the bottom. The tubes are corrugated to give a larger radiating surface. It is due to these corrugations that the coil receives its name, the corrugations forming diamond shaped openings with each other.

The same system of carrying the steering reducing gear upon the steering wheel is still used, but in the new model it is greatly improved in design, all parts being flush with the top of the wheel, giving a much neater appearance.

A combination of sliding and planetary speed gears is used, giving three speeds ahead and reverse. A centrifugal governor acting upon the throttle valve has been added to the new car. An additional hand operated throttle is also provided.



OLDSMOBILE TONNEAU.

GENERAL AUTOMOBILE AND MFG. COMPANY.

The General Automobile and Manufacturing Company, formerly the Cleveland, showed two cars and a detached engine at their space. The cars are similar in their construction, one being of the runabout type and the other of the same style of body with tonneau attached.

The body of the car is independent of the chassis, which is equipped with a two cylinder horizontal engine of 9 horse power, two speed planetary gears, single chain drive to live rear axle, and an emergency brake on the differential. The regular brake is applied by throwing in the reverse and releasing it before the vehicle changes its direction.

Ignition is by jump spark, a separate induction coil being provided for each cylinder. Dry cells furnish the electricity. An automatic oil pump forces oil to all bearings.

The standard runabout body, with or without tonneau attachment, as shown at the exhibit, is the only body furnished, color, trim, etc., being optional.

BUFFALO GASOLENE MOTOR COMPANY.

Five gasoline motors of 2, 4, 8, 14 and 25 horse power each comprised the exhibit of the Buffalo Gasolene Motor Company. The two cylinder, 2 and 4 horse power motors and the four cylinder, 8 horse power motor are suitable for automobile work, the two larger sizes being intended for gasoline yachts.

The motors all use mechanically operated inlet valves and make and break spark. The spark is shifted by means of a small lever attached to the side of the engine.

The company have discarded the vaporizer they formerly put on their motors and are now using a float feed carburetor. If desired, the motors are equipped with a sight feed multiple oiler.

THE AUTOCAR COMPANY.

The exhibit of the Autocar Company, of Ardmore, Pa., consisted of a standard tonneau chassis, a tonneau car and a stanhope. The stanhope differs very slightly from last year's model. Instead of a vibrator spring a plain cam contact breaker with trembler on the induction coils is now being used.

The tonneau is equipped with a two cylinder horizontal motor placed under a hood. The cylinders are 3¾ inches bore by 4 inches stroke and develop 10 horse power when running at a maximum speed of 1,200 revolutions per minute. Air is supplied to the carburetor through a hollow dash and is throttled as in previous models by turning the gear lever handle. Two induction coils provided with tremblers are fastened to the dash. Columbia dry cells fur-

nish the electricity. The spark shifting device is placed on the steering post.

The sliding gears, giving three speeds forward and a reverse, are all operated by one lever. The intermediate flywheel clutch, operated by a pedal, consists of a bronze plate, attached to the flywheel, which is clamped by two cast iron shoes on the gear shaft.

A hand fed pump oiler is attached to the dashboard and supplies sufficient oil with one filling to run the car 30 or 40 miles.

The frame is of wood armored with one-quarter inch steel on the inside. The front springs are semi-elliptic, the rear full elliptic. The wheels, of artillery pattern, have roller bearings. The rear wheel drive is by universal joint and gears to a live axle. The differential consists of a spur gear and pinions instead of the customary bevel gears. The car is equipped with two sets of brakes, one acting on drums on the rear wheels, and the other on a drum on the driving shaft.

THE U. S. LONG DISTANCE COMPANY.

The Long Distance Company exhibit comprised two of their Type C tonneau cars, one fitted with a touring top and side curtains, the other with the body removed to expose the chassis; one Type B, and a Type A runabout. The runabout shows several departures from last year's model. The car now has three speeds forward and reverse, both inlet and outlet valves are mechanically operated, the pump is gear driven, the wheel base is one foot longer and a wheel is used instead of the old style steering lever.

The tonneau is fitted with a two cylinder vertical motor under a bonnet. The cylinders are 5 inches bore by 6 inches stroke, and develop 12 horse power. The cylinder heads and cylinders are two separate castings bolted together. Both valves are mechanically operated.

A centrifugal governor acting on a butterfly valve throttles the mixture, the proportion of gas to air always remaining constant. A make and break spark is used, two sets of dry batteries being furnished.

The speed gears are of the planetary type, giving three speeds forward and a reverse; they are operated by one lever. A universal joint transmits power to a bevel gear on a live rear axle. Oiling of all parts is automatically accomplished by a sight feed multiple oiler located on the dash.

The chassis frame is of angle iron; the springs, both front and rear, are semi-elliptic; wheels, artillery type; wheel base, 6 feet 8 inches and gauge standard.

THE LOOMIS AUTOMOBILE COMPANY.

The Loomis Automobile Company, of Westfield, Mass., exhibited their one standard type, which is called the "Bluebird" on account of its finish. The car is of the tonneau type, fitted with a 12 horse power motor placed vertically under a front hood. There are two cylinders of 4½ inches bore by 4½ inches stroke, the heads being separate castings bolted to the cylinders. The engine has a normal speed of 800 revolutions per minute. No automatic governor is provided, the speed being controlled by a butterfly valve in the intake pipe, regulated from the seat.

The car is equipped with three forward speeds and a reverse, all operated by one lever. The gears are operated by friction clutches. A single chain drive to a live rear axle is used.

Oiling is entirely automatic. The frame is of angle iron, springs are semi-elliptic, with a compound sweep at each end, giving greater length and flexibility. The wheels are artillery type, 30 inches in diameter with 3½ inch double tube tires. The wheel base is 84 inches long, gauge standard.

THE PAN-AMERICAN MOTOR COMPANY.

A car the public appearance of which has been awaited with much interest and which was shown this year for the first time is that of the Pan-American Motor Company, of Mamaroneck, N. Y. Two cars were shown, the only difference being in body design and an extra long wheel base in the larger car. A chassis with gears exposed gives an excellent idea of the construction of the car.

A four cylinder vertical motor is used, giving 20 horse power. The cylinder dimensions are 4½ inches bore by 5 inches stroke and the normal speed is 700 revolutions per minute. A special feature of the motor is a combined concentric exhaust and inlet valve. A large cast sleeve, readily removed from the motor, carries the exhaust valve and seat. The stem of the exhaust valve is greatly enlarged in diameter and is hollow, serving as the inlet valve casing. By this arrangement the incoming mixture serves to greatly reduce the temperature of the exhaust valve parts.

A centrifugal ball governor, driven from the end of the valve cam shaft, operates on the throttle. Jump spark ignition is used, storage batteries furnishing the electricity. A separate coil is used for each cylinder.

The speed gears are of the sliding type, giving three speeds forward and a reverse. The forward speeds are operated by one lever at the right of the operator. The reverse is thrown in by raising a lever coming through the floor at the operator's left. The high speed is by direct drive to the differential. Two chains from the countershaft drive the rear wheels.

The frame is of wood reinforced by three steel plates. Springs are semi-elliptical. The wheel base of the smaller car is 7 feet, of the larger, 8 feet; the gauge is standard. The wheels are 34 inches in diameter and fitted with 4 inch tires.

The steering gear comprises a worm and sector, the ratio being such that the wheels are practically irreversible.

A 15 gallon gasoline tank is carried under the front seats and a water tank of 10 gallons capacity is attached to the chassis. This provides fuel sufficient for an all day journey.

The exhaust gases are first admitted to an expanding chamber, where they cool considerably and lose their high velocity before entering the muffler proper. Oiling is accomplished by a sight feed multiple oiler feeding all the parts automatically by water pressure. The pistons are oiled by the splash of the cranks, which carry small buckets to better catch and distribute the oil.

SPAULDING AUTOMOBILE AND MOTOR COMPANY.

The automobile shown at this company's space was described to THE HORSELESS AGE representative by Harry D. Baird, M. E., the inventor and designer, as follows:

The general design is that of a touring car, with motor in front and detachable tonneau style body. The motor is a two cylinder, four cycle one, and develops 25 horse power at 1,900 revolutions per minute. The bore is 5 inches, with 4½ inches stroke. The cranks are so disposed that the engine always stops in such a position that it may be started again at any time, within forty minutes after stopping, by turning on the battery switch. Lubrication is by splash. The water circulating system is so arranged that when the engine stops all water is drained from the cylinder jackets, radiators, pump and piping into the water tank.

The transmission, of the sliding gear kind, has three speeds and a reverse and drives direct on the high gear. The gears are so fashioned that they can be slid into mesh whether the motor is running or not.

The car has wheel steering. A column rises in the centre of the footboard, from which extend two handles, one for shifting the gears and another the ignition timer, the motor speed being controlled solely by the spark.

The carburetor is of the company's own design. The gasoline tank is several feet lower and the gasoline is forced up to a constant level by a pump, the company having found this method to be much more reliable than the float.

The main brake acting on the transmission is operated by a foot pedal. Auxiliary brakes on the rear wheel hubs are controlled by a lever.

Double chain drive is employed, the rear axle being fixed. The wheels are artillery, with plain bearings.

The car weighs 1,650 pounds. A speed of 40 miles per hour is guaranteed.

THE WALTHAM MANUFACTURING COMPANY showed a runabout of tasteful design, one of their standard motor bicycles, and quite a novelty in the shape of a motor propelled buckboard. The runabout is equipped with an 8 horse power single cylinder, vertical motor of the company's own manufacture. The motor is carried upon the frame directly over the seat and transmits its power to an Upton two speed and reverse gear and thence by chain to the differential. The motor is cooled by means of radiators and a circulating pump driven frictionally by the flywheel. Engine spee

is controlled by a foot throttle acting upon the float feed carburetor and the speed changes are effected by a single lever, which also operates a brake. There is an emergency brake, which acts upon the differential and is operated by means of a pedal. The form of muffler adopted is claimed to be almost perfectly efficient and not productive of back pressure. The exhaust pipe is provided with cooling pins, which are claimed to so reduce the temperature of the exhaust gases as to assist the muffler very greatly. The carriage has a wheel base of 80 inches and weighs 1,140 pounds. All bearings are of the ball type, and either wood or wire wheels with 2½ inch tires are furnished at the option of the purchaser. A folding front seat is provided which enables four people to ride when desired.

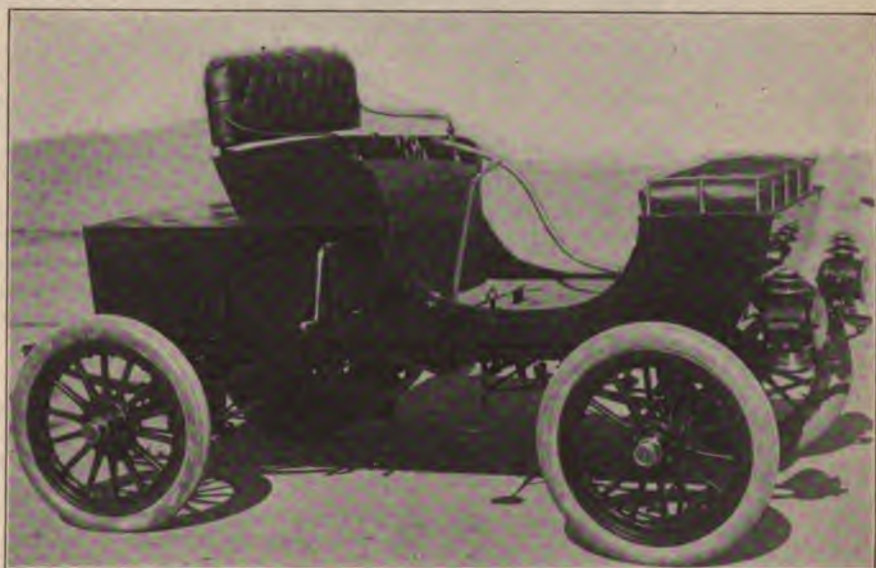
The light buckboard shown by this company is of very neat appearance and quite a novelty. It is a buckboard in every sense of the word, and although its gauge is only 3 feet 6 inches it has a wheel base of 80 inches. The motive power is a 4 horse power air cooled vertical single cylinder engine of Orient manufacture, directly geared to the rear axle with a ratio of 7½ to 1. There is no change speed gear. The engine runs a fan which forces air through an aluminum blow tube upon the copper cooling flanges of the motor cylinder. The motor is started by means of a strap and ratchet gear. Four gallons of gasoline are carried and it is claimed that the little vehicle will carry two people over all ordinary roads.

THE KNOX AUTOMOBILE COMPANY

showed a very creditable exhibit consisting of several of their standard carriages, of which only one type is manufactured. Some of them were shown equipped with tops and some without. They showed the standard motive power equipment detached from the carriage and in condition for easy observation. There was also quite an exhibit of engine parts. This carriage is so well known as to hardly require extended description. This year's model has been somewhat increased in weight and now tips the scale at about 1,600 pounds. A somewhat larger engine is used, the dimensions now being 5x8 inches. The characteristic hedgehog, air cooled construction is adhered to, but there have been some refinements made in details of the engine. The exhaust and inlet valves have been alternated in position from considerations of accessibility. The connecting rod and some other parts of the vehicle are composed of aluminum bronze, which is cast at the Knox factory by a secret process. The outboard engine bearing has been done away with. A contact device of the most substantial character is used, equipped with specially hardened platinum points, and the clutch has been much improved and somewhat changed in style. The muffler now consists of three chambers instead of two. The running gear has been considerably strengthened, roller bearings have been adopted throughout, and wood wheels are now standardized instead of wheels of the wire type. Three and one-half inch tires now form the regular equipment, and the rig will carry four people when desired. The gasoline tank has a capacity of 12 gallons and in the rear of the body is a very large carrying space for baggage. There are quite a number of small details that have been most conscientiously worked out; for instance, the carburetor contains a detachable atomizer. There is a special provision for starting the engine in cold weather by allowing a priming charge to drip upon the fabric cover of the air inlet pipe. The spark plug is a special one and very much larger and more substantial than the ordinary commercial plug, and there are a variety of interesting points which have been well taken care of.

THE CENTURY MOTOR VEHICLE COMPANY,

of Syracuse, N. Y., exhibited their two or four passenger carriage, which they style the Century tourist. This is a medium weight vehicle, tipping the scales at 1,100 pounds. Though built somewhat on the lines of a runabout, it is heavier and more substantial than most runabouts, and four passengers can be carried easily. The horizontal motor has a single cylinder 5x6 inches and develops 7 horse power at 700 revolutions. The jacket water is circulated by a rotary pump, the wear of which is taken up automatically. The pump is driven by gearing from the engine shaft. The gear, which is coupled direct to the engine shaft, gives two forward speeds and reverse, and is operated by a single lever. No gears are used on the high speed. Jump spark ignition is used. Vaporizer is of the float feed type. The live rear axle runs on four rows of balls, and is driven by a roller chain. Wheels are of wood, with 3 inch tires. Wheel base is 6 feet; tread, standard.



CENTURY GASOLINE CAR.

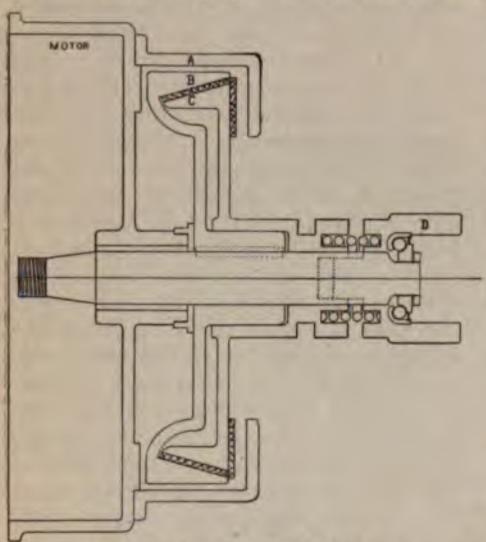
THE AMERICAN MOTOR CARRIAGE COMPANY

made a very tasteful exhibit of their runabout. The vehicle is very attractive in appearance and should be a comfortable carriage. The engine is horizontal and of the single cylinder type, of 5 inches bore and 6 inches stroke and rated at 7 horse power. The water jacket is square in form, of cast metal and separate from the cylinder and head and also from the crank case—the joints being ground in. Carburation is by means of the Longuemare carburetor and ignition by means of the Huff jump spark coil. Water circulation is by means of a gear pump carried on the main engine shaft which supplies the radiator located in the extreme front of the carriage. Transmission is by means of a planetary system controlled by a single lever and giving two speeds forward and a reverse. A magazine gravity feed lubricator oils all the bearings, and it is so arranged that the electric switch cannot be turned on without at the same time starting the lubrication. A foot throttle regulates the engine speed and an automatic spark governor takes care of the time of ignition. The wheel base is sufficiently long to secure easy riding, steering is by means of an extra large wheel capable of being turned aside for convenience in entering the vehicle, and the wheels are of 30 inches diameter, of the artillery type and equipped with 3 inch tires. The gasoline capacity is 7 gallons and the water capacity 4 gallons.

THE HAYNES-APPERSON COMPANY

made a very attractive showing with a surrey equipped with hood over the rear seat, one of their standard road wagons and a runabout. The production of this concern has been so well standardized for a number of years as to render any description superfluous. Some few changes have, however, been made. Wheel steering has been adopted, although the tiller is still recommended. The inclined steering column furnished is provided with a sliding bearing

at its lower end so that the column may be shoved entirely out of the way of the occupants and yet be entirely secure. Roller bearings have been adopted, not only upon all the wheels but upon the gear shafts in



Covert Clutch and Brake.

the transmission device. A spark advancer has been fitted to the equipment and acts to give a variable lead to the contact sparkers. The starting crank which heretofore has been detachable is now permanently attached to the engine shaft through a ratchet mechanism and is of very neat appearance. The circulating pump which was formerly connected by a chain is now directly geared and aluminum has been adopted for the material of the tubular radiator in order to effect a saving in weight. Four inch tires are used upon the 36 inch wheels so long used by this company, and the form of the body, which is easily detachable from the chassis, has been improved in appearance, especially as to the form of the bonnet, which now contains ample carrying space.

FICKLING & FULTON,

of New York, sales agents for the Covert motorettes, made up their display out of two carriages of this make. The smaller vehicle was equipped with a high speed vertical motor of 3 horse power, air cooled cylinder and water cooled head. Two forward speeds, but no reverse, are provided. All the machinery being on the running gear and the body being very light, only light springs are required. The little carriage had four elliptics of but one leaf each.

The other machine was larger and of a different type. Its engine was of the de Dion pattern, rated at 5 horse power, and had been placed under a bonnet in front. The change speed gear was of the planetary variety, and provided two speeds forward and a reverse. A hinged wheel, with direct arm to the steering link, constituted the steering device. A foot brake and a hand brake were also provided. The weight of this bevel gear driven car was said to be 650 pounds, and the tank capacities 6 and 4 gallons of gasoline and water respectively. Both machines were equipped with thermo-siphon circulation.

THE BACKUS WATER MOTOR COMPANY,

of Newark, N. J., exhibited a stanhope type vehicle with a large single cylinder air cooled engine of 5 inch bore and 8 inch stroke. The working cylinder was surrounded by an outer sheet metal cylinder, through which air was forced by a Root blower. The transmission was of the individual clutch type, giving two forward and a reverse speeds. All wheel bearings were plain, those of the live rear axle being bushed with nickel bronze. Ignition was by jump spark and the full capacity 15 gallons.

One of the largest displays was that of the

LOCOMOBILE COMPANY OF AMERICA,

which exhibited seven complete vehicles, a chassis and a finished tonneau body. Since the Locomobile gasoline touring car was described in these columns some improvements have been made. A revolving slide has been added to the dash to regulate the amount of air admitted to the cylinders. To wash out the latter a kerosene hand pump has been provided. A special spark plug was fitted to all the gasoline cars shown, for which the claim is made that it is not affected by soot and cannot become short circuited.

One of the four cylinder gasoline cars was equipped with a tonneau, canopy top and a glass front for protection against the weather. Another machine with the same size chassis was fitted with an aluminum limousine body with heavy cut plate glass windows. A third vehicle had a spacious "Roi des Belges" tonneau body, the panels and backs of which were of sheet aluminum. A smaller gasoline tonneau with a double cylinder (4x5 inch) engine was also placed on exhibition.

THE HALL MOTOR VEHICLE COMPANY,

of Dover, N. J., exhibited their 20 horse power gasoline touring car, recently described in The Horseless Age. The body of the machine was of aluminum and of the tonneau type.

THE AMERICAN GEORGES-RICHARD COMPANY,

New York, displayed two new models. One of them was a 20-24 horse power tonneau propelled by a four cylinder vertical engine and fitted with a three speed sliding gear. All the forward speeds were controlled by a single lever, and a smaller lever was provided for the reversing mechanism. Like most of the French cars of a heavier type it was equipped with a gear driven magneto and a Mercedes type magazine lubricator on the dash. A throttle governor was provided and a small lever to accelerate the speed of the motor by cutting out the governor.

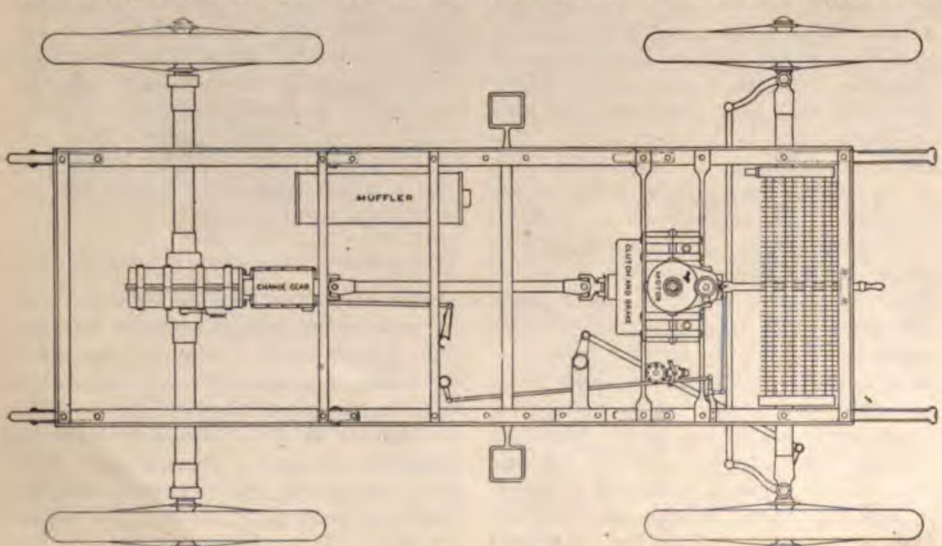
A smaller touring car with a double cylinder motor rated at 14 horse power was also shown. Instead of a magneto it had a storage battery to furnish the electric current.

The exhibit of

THE CLEVELAND AUTOMOBILE COMPANY

was quite extensive. They showed a number of touring cars and also several runabouts, with one of each type entirely stripped for inspection. The runabout employs a single cylinder horizontal motor of 4¾ inches bore by 6 inches stroke, with mechanically operated valves, jump spark ignition, and readily removable valves and float feed carburetor heated by the muffler gases. A planetary transmission gear gives two forward speeds and a reverse, which are controlled by a single lever. The control is by a foot operated throttle, manual spark regulation, side lever steering, and two separate brakes, one acting upon the transmission gear and the other acting on hubs carried by the rear wheels. A pedal also acts to cut out the muffler if desired. The frame of the vehicle is of steel channels and the wheels are 28 inches by 2½, the wheel base 72 inches. Semi-elliptic springs are used throughout and the differential gear is carried on one side of the rear axle upon a sleeve and is connected to the transmission device by chain.

The touring car manufactured by this concern is equipped with a double cyli



Plan of Covert Runabout.

der, horizontal opposed motor of large bore and stroke, which transmits power to a three speed sliding gear transmission that is provided with an interlocking device to prevent mishandling. Transmission to the rear axle is by a chain to a differential located upon one side upon a sleeve. The main clutch is incorporated into the flywheel. The water circulating pump is very cleverly embodied in the secondary shaft valve operating mechanism. The vehicle has wheel steering, with means for shifting the wheel out of the way of the occupants, magazine oiling to all bearings, and large tanks for water, oil and gasoline within the bonnet. As in the runabout, the valves are mechanically operated and easily removable, and all parts of the mechanism seem to be readily accessible.

PACKARD MOTOR CAR COMPANY.

In addition to the well known Model F Packard, the Adams-McMurtry Company, of New York, showed a four cylinder Packard touring car, which embodies all the characteristics of the French type. The engine is of 25 horse power, placed vertically on the extreme front of the chassis. Cooling is by means of flanged pipe radiators and geared pump. Two carburetors are provided, one for each pair of cylinders. Engine control is by means of an automatic governor, the spring tension of which is mutually determined by a handle on the steering wheel. Ignition is advanced proportionately to the opening of the throttle by means of a mechanical connection. The clutch is of cone type located in the flywheel, and the speed changes are effected by means of sliding gears which run in oil and provide four forward speeds and a reverse, with no idle gears operating on the highest speed. There is a safety interlock to prevent mishandling of the gears and clutch, which latter is operated either manually or by pedal. A belt driven mechanical lubricator supplies all bearings. Power transmission to the rear axle is by means of a flexible shaft and bevel gears provided with ball bearings. Braking is by means of powerful straps on the rear hubs and a drum brake in the transmission gear. The rear axle is extremely powerful and the frame is composed of steel girders remarkably well proportioned. The vehicle was shown without the body, and every part of it was visible and showed excellent workmanship and design. The changes in the Model F 12 horse power single cylinder convertible tonneau vehicle are very slight. Some details in lubrication have been modified, the bonnet has been lengthened and the tanks arranged within it, but in general the model seems to have survived with very little alteration.

At the stand of the

MOTOR CYCLE MANUFACTURING COMPANY,

Brockton, Mass., two 1903 model Marsh motor cycles were displayed. Judging by their appearance they were quite an improvement on last year's model. The wheel base had been lengthened out to 50 inches, and a larger motor (of 3 horse power instead of 1¾ horse power) was employed. The following are some of the specifications of the motor:

Diameter of fly wheels, 9⅝ inches; diameter of cylinder, 3⅛ inches; length of stroke, 3½ inches; length of bearing on gear side, 1⅜ inches; length of bearing on driving side, 2¼ inches, and weight of flywheels, 25 pounds.

Larger flywheels and a wider belt were adopted by these makers, and the large pulley has been incorporated in the rim of the driving wheel, with which it forms an integral part. Heavy 28x2 inch motor cycle tires, with five lugs, a ball bearing idler and a muffler of double the cubic contents of the former one, constitute some of the improvements. The new gasoline tank holds 6 quarts instead of 3 quarts, and the weight of the cycle, which was formerly 105 pounds, now amounts to 125 pounds.

MARSH 1903 MOTOR CYCLE.

THE STANDARD AUTOMOBILE COMPANY,

of New York, exhibited two tonneau touring cars of 10 and 20 horse power (two and four cylinder motors, respectively), of which the following are the specifications furnished by the agents: Weight, about 1,350 pounds for 10 horse power and 1,430 for 20 horse power; speeds (subject to throttle control), 10 horse power—8, 20 and 35 miles per hour without accelerator; accelerated speed up to 40 miles per hour; 20 horse power—10, 25 and 50 miles per hour; three speeds and reverse, with direct drive on third speed; all gear drive, no chains; all gears run in oil baths; wheels, 32 inch wood wheels all same size with 3½ inch Michelin tires; wheel base, 10 horse power, 6 feet 6 inches; 20 horse power, 8 feet; engine, 10 horse power, two cylinders, 4⅜ inches stroke and 4⅜ inches bore; governed on admission; normal speed, 1,000 revolutions per minute; speed limits, 400 to 1,800 revolutions per minute; 20 horse power, four cylinders and other specifications same as 10 horse power; new type radiator with small tubes; brakes on rear wheels and on gear box shaft, all interconnected with clutch; hand control of spark and throttle; flywheel and clutch encased against mud and water; gasoline tank capacity, 150 miles; ignition, dynamo and storage battery.

[The smaller car was described in detail in a former issue of THE HORSELESS AGE.]

KENNETH A. SKINNER

had a very comprehensive exhibit of De Dion carriages and motors in the basement. The collection of vehicles included one 9 horse power French phaeton with canopy top; one 9 horse power tonneau; one 6 horse power surrey; one 6 horse power motorette; one 15 horse power two cylinder tonneau; one 6 horse power closed brougham, operated from the inside; one 6 horse power two seated rockaway, and in addition an old style motorette was kept in the street for demonstration purposes. The exhibit further included single cylinder vertical De Dion gasoline motors of 9, 6, 4½ and 3½ horse power respectively, and a direct connected De Dion electric generating set, which will serve either for furnishing current for thirty 16 C. P. incandescent lamps or for charging an automobile storage battery with the usual number of cells.

THE CREST MANUFACTURING COMPANY

showed two styles of their Crestmobiles. One is the light runabout, already described, with a small air cooled motor on the front axle, with a long chain drive back to the rear axle.

The other is a heavier machine, also with an air cooled motor, but of more power. The motor in this machine is spring suspended, with a direct shaft transmission to the change gear case on the rear axle. The spring ratchet pulley, with leather belt and handle for starting, is about half way back on the main shaft, bringing it up just in front of the seat.

THOMAS B. JEFFERY & CO.

had on exhibition their new Rambler automobiles, as well as one of their last year's model. The full elliptic springs of easy riding qualities with which these machines are equipped and the weight would indicate durability. The adoption of wood

wheels and the increase in size of the motor have increased the weight to about 1,200 pounds.

To the descriptions of former models that have appeared in THE HORSELESS AGE may be added that the carburetor is of an improved form and is self adjusting to the speed of the motor, so that the mixture will remain uniform at all speeds. This is accomplished by an adjustable spring restrained valve, controlling the extra air inlet. An ingenious device for preventing short circuiting of the ignition plug by rain consists of a conical cap fitting over the end of the plug, thus shedding the water.

The timing of the spark is controlled by a governor, and the spark, it is claimed, occurs just at the right time for each speed. This eliminates one element of control from the operator's mind and prevents the possibility of any back kicking when starting the motor.

Although one of the low priced class of automobiles, it is equipped with auxiliary brakes, a commendable feature and one that should be on every automobile.

THE POPE-ROBINSON COMPANY

showed two of their touring cars at their stand. Compared with the usual motor in front style of vehicle they have the advantages of having all parts sufficiently above the ground to avoid striking any ordinary object that might lie in the way or the thank-you-ma'ams on hilly country roads. The four cylinder 24 horse power engine is easy to get at. The crank shaft has five bearings—a good feature. The water cooled heads are not cast in one piece with the cylinders, but the joint is made tight by using a thin copper gasket and leaving the lines left by the tool in the lathe intact. Lubrication is by the splash method, both in the engine and the transmission. Oil is injected at regular intervals into the crank case by means of a pump. The transmission of three speeds ahead and a reverse is controlled by individual clutches for each speed, the transmission being direct on the high gear.

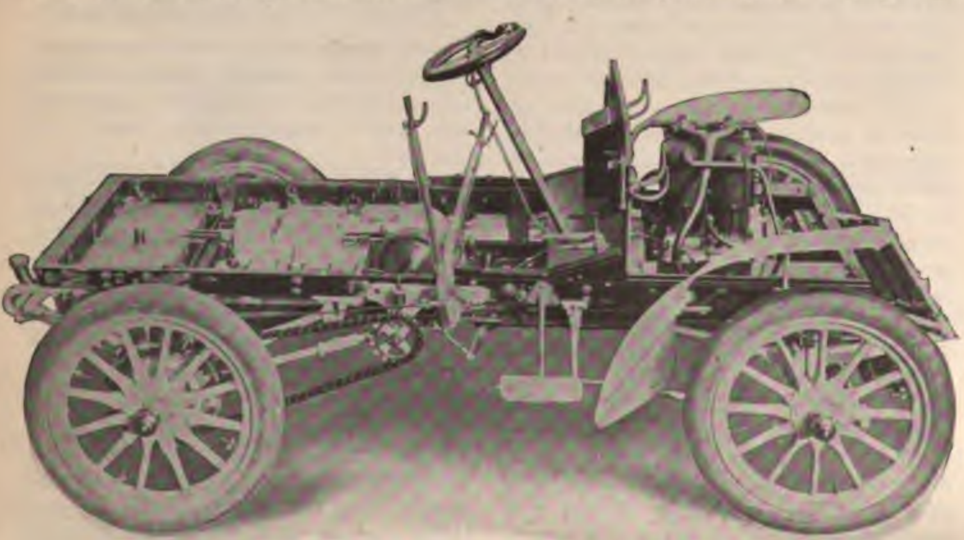
J. STEVENS ARMS AND TOOL COMPANY.

Of the Stevens-Duryea cars two examples were shown near the northeast corner of the main hall. There have been comparatively few changes in this machine for this season, the following being some of the chief points embodied in the design:

The car has a two cylinder, horizontal motor developing 7 horse power, and a carburetor of the float feed type. The engine is built with a drop forged crank shaft and the design of the valve mechanism has been reduced to an extreme simplicity, a single cam serving to operate the valve of both cylinders. Four gallons of cooling water are carried and are circulated by means of a positively driven valveless pump, one filling of water being claimed to last a week under ordinary conditions. The motor is started from the seat and a back kick is said to be an impossibility in starting. The transmission gear is of special design, being of the individual clutch type and giving three forward speeds and one reverse, all operated by one lever. The clutches are of the expanding shoe type and said to be very easy of adjustment. The steering is a modification of wheel steering, only one spoke of the wheel being used. The wheels are of the artillery type with 12 spokes and rims for 28 by 3 inch detachable tires. The body is of the combination type, adapted to carry either two or four persons, and a victoria or buggy top forms a part of the regular equipment.

THE SEARCHMONT AUTOMOBILE COMPANY'S

stand occupied the centre space along the Broadway wall in the main hall, the same as last year. Conspicuous among the exhibits at this stand was the new "type VII Searchmont car," which is fitted with a double cylinder 4½x5 inch vertical motor placed forward under a bonnet. The motor is rated at 10 horse power and will, it is claimed, develop from 10 to 12 actual brake horse power on the testing stand when new, but will give from 1 to 2 h power more after a few months' ser The motor cylinders are made from best gray iron and are cast with head cylinder in one piece, doing away wit troublesome water connection betwee two. The engine base is made of al num alloy, combining strength with l ness. The crank is made from forged with the pins set at 180 degrees, thus ing a very smooth running motor. exhaust valve lifters are so arranged they can be removed from the motor by simply removing two nuts, and ca replaced within ten minutes. The ex valves are made of nickel alloy. The mission valves are placed directly ove exhaust valves, where they can aid in k ing the latter cool, and where there wi no danger of broken pistons and cyli heads, due to careless adjusting of th mission valve fastenings. The conne rods are made of forged steel, very and strong, and are fitted with phos bronze bearings. The motor is throughout with phosphor bronze ings and has all gears encased to base, including the pump gears. motor has four aluminum doors, pe ting the adjustment of rods or any o internal bearings without pulling the tor apart. The engine weighs 345 po complete, with flywheel, water pump, buretor and all necessary piping.



CHASSIS OF SEARCHMONT, TYPE VII.

H. H. FRANKLIN MANUFACTURING COMP

The exhibit of this firm was locat the basement and comprised a numb vehicles of their new model, and in tion a chassis and parts of the engine. siderable interest naturally centred in car for the reason of its being one o few air cooled machines now on the A ican market and possessing distin points of originality. The improveme the new vehicle consist in the substit of wood wheels for wire wheels and lengthening of the wheel base. The u wood wheels with large tires has som added to the weight of the carriage, is now 1,100 pounds; but, as the four der motor develops 10 horse power th hicle is still one of the most highly po upon the market. The transmission the sun and planet type, extremely co and is rarely used except on very stee and on very heavy roads, control bein fected almost entirely with the th Only a single coil is used for the fou inders and all the cylinders are cont by a single throttle. The intake an haust valves are designed on the " plan and open directly into the cyl The vehicle is provided with wheel st and separate seats—a feature seldom in vehicles of the light or medium The four throw crank shaft has five rate supporting bearings.

ELMORE MANUFACTURING COMPANY

The Elmore exhibit was located i basement and comprised a 1903 mode about, one of their new tonneaus a

separate engine with head removed, which was placed on a stand close to the aisle and served to explain the principle of the two cycle to the public as it passed. The vehicles were retarded on the road and during the first few days only the engine was on view on the stand.

THE BUCKMOBILE COMPANY,

of Utica, N. Y., showed a motor propelled buckboard equipped with a vertical motor, and this was one of the novelties of the Show. The motor is 4⅜x4¾ inches and double cylinder. The change gear is by means of sliding pinions and clutch, with two forward speeds and reverse. The stated weight is 1,000 pounds, and a speed of 25 miles per hour is claimed. The buckboard is an interesting innovation in motor circles, as it does away with springs and completely discards the accepted method of frame construction.

THE MOYEA AUTOMOBILE COMPANY

exhibited their handsome four cylinder touring car, with 4x5½ engines cooled by means of a cellular radiator, air fan and gear circulating pump. Ignition is by jump spark from an Apple generator. The contact device is of substantial construction and located on the dash directly in view of the operator. A single carburetor supplies all four cylinders and a throttle located upon the steering column controls the engine speed in connection with an automatic governor and manual spark advancer. The clutch is integral with the flywheel and of the cone type. The transmission gives three forward speeds and reverse by means of sliding gears, and contains the differential, from which two chains extend to the driving wheels. All bearings, whether in the axles or in the transmission shafts, are of the ball type. The wheel base is 88 inches and the wheels 32x4 inches. Upon the rear hub are brake drums, and a brake is also provided in the transmission, together with means for preventing mishandling of the gears. Lubrication is by a mechanical oiler.

H. BARTOL BRAZIER.

A 15 horse power touring car was shown by H. Bartol Brazier, of Philadelphia, Pa., which followed closely the popular Continental design. Among the novelties which it embodies is a hydraulic governor upon the motor, consisting of a small pump which continually forces water through a system of piping containing a diaphragm mechanically connected to the throttle. A by-pass regulated by the throttle handle regulates the position of the diaphragm by allowing more or less water to escape through it, and thus the motor is held at any desired speed determined by the position of the by-pass. Instead of the usual sprag designed to prevent the car from running backward, a ratchet and pawl is provided in the transmission gear, which may be set to prevent reverse motion of the vehicle. In this car bevel gear, dust transmission to the rear axle is used, ...rs, two distinct sets of

WARWICK RUNABOUT.

brakes, dynamo ignition and the separate clutch method of speed variation, with no gears in operation when running on the high speed. The wheel base is 7 feet 1 inch and the wheels 36x4 inches.

THE WARWICK CYCLE AND AUTOMOBILE COMPANY,

Springfield, Mass., exhibited two stanhope carriages, with 6 horse power de Dion motors, running at a normal speed of about 1,500 revolutions per minute. In the smaller carriage the machinery was hung from the reaches, while in the other car the mechanism and the motor were secured to the frame, and the whole was, therefore, suspended by the body springs. Both machines had a three speed forward and a reverse gear of the individual clutch type, and a convertible boot or folding front seat. At the option of the purchaser 8 horse power motors are fitted. A 1¾ horse power Warwick motor cycle, manufactured under the Hedstrom-Thor patents, was also shown.

THE CONRAD MOTOR CARRIAGE COMPANY

were represented in the exhibit by a gasoline runabout of 8 horse power, equipped with a double cylinder engine of vertical type located in front, and also by a gasoline touring car of the same general construction, with a 12 horse power engine. The runabout has two forward speeds and reverse, and the touring car three forward speeds and reverse. Chain transmission to the rear axle is used, and in general the design conforms quite closely to standard practice.

A. CLEMENT & CO.,

of Paris, France, were represented by an exhibit which could not be surpassed for perfection of finish and neatness of design. The chassis which they showed might stand for the type of the "vertical motor in front construction."

THE F. B. STEARNS COMPANY

exhibited a touring car in which American methods are retained, the motive power being a 25 horse power, double opposed cylinder engine of liberal dimensions. This car should be a comfortable one, on account of the 8 foot wheel base, unusually long springs and large wheels.

THE INTERNATIONAL MOTOR CAR COMPANY.

Four tonneau cars constituted the gasoline exhibit of the International Motor Car Company: A 12 horse power, two cylinder car; two 18 horse power, three cylinder machines, one with the body unfinished, showing the combination aluminum and wood construction; and a 24 horse power car, with four separate cylinders. This car differs from their other models in many points, the most noticeable being the cylinders, each cast separately and fitted with corrugated sheet copper water jackets. The car has a honeycomb radiator placed in the front of the hood, differing from the other cars which use a regular coil cooler hung from the front of the chassis.

The car is equipped with both dynamo igniter and dry batteries, either of which is thrown into service by means of a three throw switch.

The speed changing gears are of the sliding type, all speeds being operated by a single lever. The gears give three forward speeds and a reverse. The drive is by chains to the rear wheels.

FOSTER AUTOMOBILE AND MANUFACTURING COMPANY.

The gasoline touring car at this space was of the tonneau variety, and equipped with a high speed gasoline motor, which was located under a hood in front. The ignition was by jump spark, and a rotary pump was provided to force the water through the cooling system. The water tank capacity was 5 gallons. Two forward and a reverse gear speeds, with a single operating lever, were provided. The main clutch was located in an oil tight case with the equalizing gear. The body and frame were suspended by platform springs in the front and in the rear. Wheels of 28 inches, with 3 inch tires, ball bearings in front plain bearings in the back and hub brakes

had been provided. The weight of the car was said to be 1,100 pounds.

THE UNION MOTOR TRUCK COMPANY,

of Philadelphia, Pa., had one of its 3 ton express wagons on exhibition, and a vehicle of the same type for demonstrating purposes. The truck exhibited had a 25 horse power four cycle gasoline engine (5 inch bore and 6 inch stroke). Power is transmitted to the rear axle in this system by means of a movable crank pin and a roller ratchet. The machine was described in a former issue of THE HORSELESS AGE.

STEAM CARS.

LOCOMOBILE COMPANY OF AMERICA.

During the early part of the week the company exhibited a steam delivery wagon, but was obliged to remove it to make room for a carriage. Of the steam vehicles shown it must be said that they were of heavier construction than machines built along the same lines in the past. One of them was a steam stanhope of about 1,600 pounds weight, with a long wheel base, artillery wheels and a wheel steering device. It was fitted with a pair of double acting hub brakes and a pair of double acting brakes each side of the differential. Both brakes were pedal actuated. The throttle lever was secured to a tube surrounding the steering column. The engine was of the enclosed pattern, with splash lubrication and fitted with means for taking up the leakage of its pistons. The bore and stroke were 3 and 4 inches respectively. The crosshead was of the roller type, and, instead of ball bearings, roller bearings were used in connection with the crank pin end of the connecting rod. A lever secured to the frame near the boot controls the auxiliary air and boiler feed pumps, and may be set by means of the foot. A Klinger water glass without check valves, an encased back-fire proof burner, superheater, mechanical lubricator, a pilot light and generator, and a water register that indicates the water level in the boiler constitute some of the improved devices that were fitted. The heavy steam surrey shown was equipped with most of the devices enumerated above. A lighter type of surrey was also shown, as well as a runabout with leather dash, both of which were said to contain all the improvements of up to date carriages of their class. An interesting feature of the Show was the display of parts belonging to the steam carriages built by the company. In a large glass case the various awards, such as medals, cups and diplomas, which machines of the company have won in contests, were shown.

THE STEARNS STEAM CARRIAGE COMPANY,

of Syracuse, N. Y., displayed four of its vehicles. One of them was the machine that was put through the Reliability Contest and lost a first class certificate on account of having arrived at several controls ahead of time. A victoria top stanhope, a convertible trap and a touring car were also exhibited.

THE LANE MOTOR VEHICLE COMPANY

exhibited three vehicles, one of which, their latest model, is a touring car with wood artillery wheels, surrey type of body and solid panel seats. This machine has an 87 inch wheel base and a standard tread, and is equipped with a 20 inch boiler and 3x3½ inch engine, with the Lane system of splash lubrication for both engine bearings and cylinders. The weight of the vehicle with tanks empty is 1,500 pounds. The gasoline tank, which holds 12 gallons, is placed in the forward compartment, and the water tank (28 gallons) is located in the rear. The range of the carriage is 1 mile per gallon of water. In addition to the cross head pumps the vehicle is equipped with an auxiliary steam air pump. A Klinger gauge glass is used and an improvement has been made in the method of fitting it to the body by which the searing of the varnish around the openings in the body panels through which the connections to the gauge glass pass is avoided. The method consists in making the openings in the body panels considerably larger than the size of the connecting pipes and in fastening a long metal strip to the outside of the panel, at some distance from it, in which the connections are supported. In this manner only very little heat ever gets to the varnished panel and the varnish is not spoiled. Other recent improvements are the addition of an ejector tank filler and a fusible plug.

The Lane Company also exhibited one of their engines with sheet metal casing in which a glass window has been inserted to permit observing the splash of lubricating oil in the case.

THE WHITE SEWING MACHINE COMPANY,

of Cleveland, Ohio, made a display of the following vehicles: Three tonneau, steam touring cars, a delivery wagon and a stanhope. The latter two were machines that were put through the Reliability Run. Both of them have been described in these columns. The specifications of the touring car, which is the latest creation of this concern, were published in the issue of the 21st. The engine, which is of the vertical compound type, with oil tight crank case, is located under the hood in front and drives a flexible shaft. The boiler is located under the main seat. On either side of the body tubes are arranged through which air rushes when the car is in rapid motion, thereby creating a strong draft. The throttle wheel is secured to a spindle that passes through the steering post. A lever to control the cutoff, and a brake lever with ratchet quadrant, as well as a foot brake pedal, constitute the control device.

INTERNATIONAL MOTOR CAR COMPANY.

The 1903 steam car of this company has a condenser of new design. Tests with this new car are said to have shown an ability to run 38 miles on 1 gallon of water, and with no back pressure to the engine, even in running up hills. A new flexible is introduced on this car, which pr very easy riding and rigid alignm the working parts at the same time. body is also of a new design, appro ing, to some extent, styles adopted i oline construction. The same fo combined throttle and reverse lever tained, but in addition another le used to permit of "hooking up" the to save fuel and water on favorable Wood wheels and G. & J. detachabl are used on this model, which is cl to have a mileage range on fuel of 75 and on water over 200. The pr this car, with a light detachable dos seat, will be $1,200.

THE HOFFMAN AUTOMOBILE AND MA TURING COMPANY,

of Cleveland, Ohio, exhibited two ca inspection. One of them was a flash steam machine (described in a forme of this journal) and the other was a line tonneau, which the builders have a "General Utility" vehicle. Some specifications and features of this m were published in the issue of Janua In addition it should be said that the of the car shown was a single cylind oline motor of 8 horse power and h head cast integral with the working der. Both the head and cylinder were cooled, as well as the port valves. crank shaft bearings were of bronze a inches long. It was stated that the s crank is not affected by the action shaft when back firing takes places.

THE PRESCOTT AUTOMOBILE MANUF ING COMPANY,

of New York, exhibited the stea riage which competed in the Reli Contest last October. A new vehi the same type was also shown. Spe tions of these cars were published issue of the 21st inst. Unlike most ers of their class, the Prescotts straight axles, a relatively low cen gravity, and hub brakes. The eng protected by a leather boot.

GROUT BROTHERS,

of Orange, Mass., exhibited a large touring tonneau and a "Dion Front The specifications of the former wer lished in our last issue. Those c smaller vehicle are: 72 inch wheel 30x3 inch wheels; 7 horse power boil horse power engine. A condenser fitted to this vehicle, which is equippe a steam air pump (Victor). The en enclosed in a rubber boot. The conv front boot is large enough to accomn two adults and its seat is materially down than the main seat, enabling t erator to watch the road ahead ov head of the passenger in front of hin

The tonneau is propelled by a hor 3¾x4¾ inch engine, rated at 10 hors er. The boiler is located in front u metal bonnet, which is provided funnel, through which the air passes, ing a draft which is in proportion

speed of the car. The machine at the Show had a condenser of Aultman tubes below the level and forward of the burner. The builders claim that the 53 gallons of water in the tank are good for about 100 miles. The throttle valve in the car is operated by a wheel which is smaller than the steering wheel and can be controlled at the same time that steering is being done without removing either hand from the steering wheel.

THE DESBERON MOTOR CAR COMPANY,

of New York, exhibited a "style C" gasoline car, with tonneau weighing 1,300 pounds. The motor had two vertical cylinders of the air cooled type, with water cooled heads, and jump spark ignition. A three speed and reverse sliding gear was provided, as well as an irreversible wheel steering device. The radiator had twenty-eight tubes of one-half inch, and but 2½ gallons of water were provided for. Foot and emergency brakes and single lever control of all gear speeds were features of the car.

THE FOSTER AUTOMOBILE MANUFACTURING COMPANY,

of Rochester, N. Y., has added a gasoline vehicle to its line of steam carriages. At the company's space the steamer known as "B80" in the last contest was shown. A description of this vehicle appeared in a former issue. The other steamer exhibited was a 1903 model touring car, with a "semi-flash" boiler and a condenser. The wheel base was 75 inches, and it was hung on unusually long platform springs. The engine was of the plain bearing, link motion type, and inclosed in a rubber boot. It was rated at 6 horse power, and had a bore and stroke of 2¾ and 3½ inches respectively. Thirteen gallons of gasoline and 18 gallons of water were provided for. The makers claim that 85 per cent. of the steam is condensed, and that 100 miles can be covered on one supply of water. Other features of the car were: Trussed axles; double acting hub brakes; a pair of band brakes, either side of the sprocket of the differential gear; steam air pump; mechanical lubricator, and large pipes.

THE METEOR ENGINEERING COMPANY,

of Reading, Pa., displayed a "Meteor" steam tonneau touring car and two "Reading" steamers, one of which was a dos-a-dos and the other a runabout. The "Reading" cars are fitted with control devices on the right hand or left hand side. The following descriptions of these machines were furnished by the manufacturers:

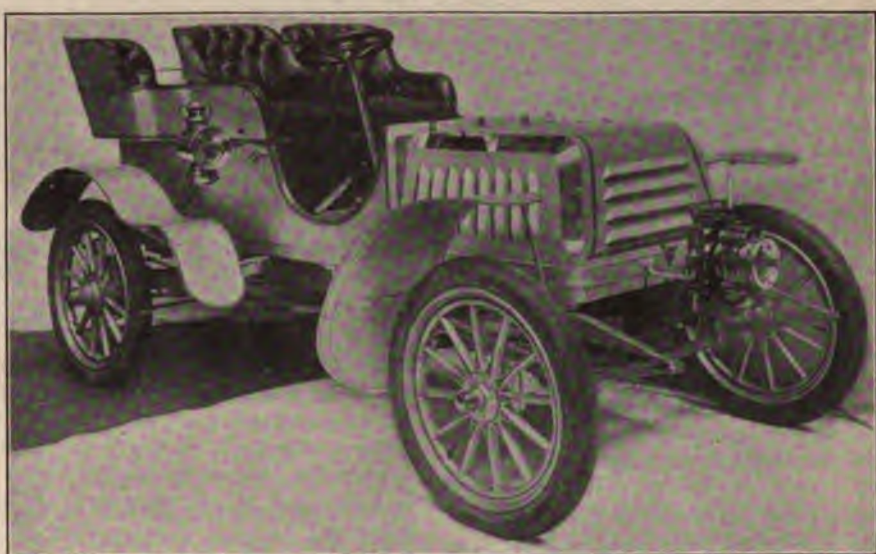
The "Meteor" steam tonneau is built along the lines of French gasoline cars, with 20 inch fire tube boiler in the front under a hood. It has 713 copper tubes, with a heating surface of about 100 square feet. The engine is of 10 horse power, of the slide valve, link motion type, and is located in a horizontal position under the footboard. The drive is from the engine to the countershaft by a heavy roller chain; from this countershaft to each rear wheel by separate chains. The driving wheels are equipped with double acting brakes, which are applied by a ratchet lever. Steam water and steam air pumps, force draft and siphon Klinger water gauge, directly in front of the operator, and positive cylinder lubrication are provided. Wheel steering and a small wheel to control the throttle, connected to a shaft running through the steering wheel post, are employed. The steam air and water pumps, as well as force draft and siphon, gasoline and auxiliary throttle, reverse and by-pass, are directly in front of and within reach of the operator.

Firing is done in front of the carriage. The burner is of 20 inches diameter and has three mixing tubes.

The wheels are of the artillery pattern, 30 inches in diameter, and are shod with 3½ inch detachable tires. The tonneau seats are removable.

The "Reading" is a machine weighing about 1,100 pounds, having a dos-a-dos seat and a body with box front, with ample space for carrying parcels, etc. The engine is of 4½ horse power, with slide valves and link motion, and is geared 3 to 1. The boiler (16 inches diameter) has 346 copper flues and 50 square feet of heating surface. Wood or wire wheels, 30 inches in diameter, with 3 inch single or double tube tires, are furnished. The machine is equipped with forced draft steam siphon, steam air pump, two gasoline tanks with 8 gallons capacity each, a 32 gallon water tank, ratchet brake, etc.

The R. M. Model weighs 850 pounds, has a long wheel base, artillery wood wheels (28 inches in diameter) and 3 inch detachable tires, slide valves, a link motion engine of 4½ horse power and 16 inch boiler. The body has a boot in front. The equipment includes an 8 gallon gasoline tank, a 36 gallon water tank, steam air pump, forced draft and siphon, Klinger water gauge.



METEOR STEAM TONNEAU.

The Electrical Exhibits.

By Harry E. Dey.

I have been asked to confine my observations to the electrical novelties at the Show, and am afraid I can hardly do the subject justice, as this branch has very few striking changes, the exhibit being in many ways a duplicate of last year and the year before. Gasoline has been taking great strides while the electric has been pegging along at the same old gait, the explanation being that the electric was born fully developed, due to previous experience with trolley cars, which only required slight modifications to adapt it for automobiles, the only factor lacking for perfect success being a satisfactory battery. Edison had his latest on exhibition, and promised limited deliveries in the early spring. If this battery will do what is claimed for it, it will mark an epoch in the electric vehicle history. It has not the long distance capacity we would like to see for its bulk and weight; in fact no more than some lead batteries, but it is claimed to last as long as the vehicles, and also not to diminish in capacity. They are also apparently strong, neat and accessible, but as they have been described so often I will not consume space here in a detailed description. The set on exhibition was composed of six crates, containing six cells each, or thirty-six cells all told, with a capacity of 200 watt hours per cell, or a total of 7,200 watt hours. The weight was 18 pounds per cell, which would be a total of 648 pounds without crates, or in the neighborhood of 700 pounds gross. The dimensions of each crate were 24x6¼x14½ inches high over all connections.

BAKER MOTOR VEHICLE COMPANY.

The Baker Company showed two new styles, one being a doctor's phaeton, with the same electrical and mechanical features as their standard type. I understand they are working on a bevel gear drive which has thus far given very pleasing results.

THE ELECTRIC STORAGE BATTERY COMPANY.

The Electric Storage Battery Company showed samples of their automobile battery plates, separators and complete cells, including some special ignition sets of three cells.

THE WESTINGHOUSE COMPANY.

The Westinghouse Company exhibited a 20 volt ball bearing motor for vehicles weighing from 800 to 2,000 pounds; its speed is 1,700 revolutions per minute; also an 80 volt low speed plain bearing motor, especially suited for direct chain drive for vehicles with single equipment, 1,500 to 1,800 pounds, and 3,000 to 4,000 pounds with double equipment; also a 75 volt medium speed plain bearing motor for 6,000 to 10,000 pounds double equipment, and a 40 volt plain bearing motor, speed 1,600 revolutions per minute, for vehicles weighing 1,000 to 1,500 pounds. They also showed special charging panels with grid type rheostats, controllers, etc.

THE ELECTRIC CONTRACT COMPANY.

The Electric Contract Company exhibited Williams' induction coils with platinum iridium contacts; Jones' speedometers, dry batteries, spark plugs, various kind of small lamps, including one for illuminating Jones' speedometer, and a special wire terminal.

THE AUTO SUPPLY COMPANY.

The Auto Supply Company exhibited Rousseau's "Ideal" electric automobile bell, which has been described in a past issue of The Horseless Age.

C. F. SPLITDORF.

In addition to his regular exhibit of coils Mr. Splitdorf showed a very high frequency one, which is demonstrated by the high note that the spark produces. He also attracted attention from all parts of the Garden by sparking a large coil, the noise of which could be heard above that of the band in all parts of the hall.

THE DAYTON ELECTRICAL MANUFACTURING COMPANY.

Mr. Apple, of the Dayton Company, exhibited his igniting dynamos with a new style internal governor. He also showed the King automatic spark timer and commutator, and the Lehman spark plug, which has recently been improved.

POST & LESTER.

A very neat little igniting dynamo was exhibited by Post & Lester, the weight of which is less than 11 pounds and is claimed to generate 75 watts continuously and to stand short overloads of several hundred per cent. The commutator has twenty-four segments, and the machine appears to be a conscientiously constructed piece of mechanism.

THE RAINIER COMPANY.

In addition to various electrical trucks the Rainier Company exhibited the Neftel combination electric-gasoline tonneau. This machine is of the "central station" type, having a standard gasoline engine and dynamo under the bonnet which generates the current to drive the two electric motors mounted on the rear axle. A storage battery in parallel with the system serves to start the engine and hold up the speed on hills, taking care of the overload, and also to propel the machine short distances in case the engine gets "balky."

I am a little skeptical as to the effect on the electric motors on the rear axle, if Fournier should ever attempt to drive the machine. I believe this system is better adapted to the light runabout type, and for the heavy vehicles the type where the dynamo is alternately dynamo and motor, according to the load. In that case it takes the place of the change gear, and is as well suspended and protected as the engine. In either system the battery suspension is quite a problem for a touring vehicle, taking "thank ye ma'ams" at 30 miles an hour. In the first system, however, the battery can be dispensed with, and while the self starting feature and some of the hill climbing power are lost, the electric system will still act as a change gear, giving large torque with low speed, and vice versa.

ELECTRIC VEHICLE COMPANY.

The Columbia people showed a new light electric runabout, a special service wagon, a hansom, an inside operated doctor's coupé and a truck, in the line of new models.

AJAX.

Mr. Simpson exhibited the Ajax, an electric vehicle, similar to the Baker runabout, but I should judge somewhat heavier.

THE GOODSON ELECTRIC IGNITION COMPANY.

The Goodson Company showed their patent magneto and spark plug, described, I believe, elsewhere in this issue of The Horseless Age. It is certainly a very ingenious, and, I should judge, practical machine.

THE NATIONAL CARBON COMPANY.

The National Carbon Company exhibited the Columbia dry cells, the Rex closed circuit cells, also primary and jump spark coils, one style of the former being metal encased.

THE NATIONAL MOTOR VEHICLE COMPANY.

The National Company showed their regular line of electric vehicles, which are made in a considerable number of styles.

THE INTERNATIONAL MOTOR CAR COMPANY.

The exhibit of Waverley electrics was quite complete, the runabout, tonneau and surrey models being shown.

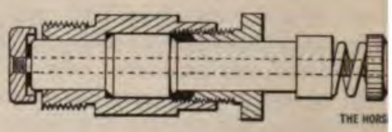
THE CENTAUR MOTOR VEHICLE COMPANY.

The exhibit of this company was located in the far corner of the restaurant, and would perhaps have escaped the attention of some visitors had not the very luminous and audible display of Fournier, who occupied a stand right opposite, drawn them to that corner. The Centaur exhibit comprised a number of their runabouts, described in a recent number of The Horseless Age.

PARTS EXHIBITS.

A. H. FUNKE,

of New York, made a display of a variety of imported horns, among there were several novelties, such a bellows and double horns. Twelve ent styles of automobile lamps were ited. A novelty was the acetylene ga with candle attachment. Whenever desired to use the lamp for signal pu only the acetylene burner is unscrew the candle attachment is inserted. out of use the candle or acetylene held securely by clamps to its lamp, b of sight. The accompanying illus



Baldwin Spark Plug.

shows the Baldwin spark plug which, said, is not affected by oil or soot. are no platinum points; one of the ter is provided with a head. The ot formed by the metal base of the pl shown. A coiled spring takes up t pansion of the rod terminal and also the nuts under tension. Some of the on exhibition were provided with rubber dust guard. Among the com gasoline motors shown were horse power double cylinder, a 7 power single cylinder, a 5 horse pow a 2¼ and 1¾ horse power air cooled motors.

THE R. E. DIETZ COMPANY,

of New York, exhibited a large num kerosene and acetylene lamps, such a lights, side lights, tail lamps, etc. "Regal" oil lamp is now equipped w tings that will go over a round or long bracket. The oil reservoir i held by a spring clip, so that it drop off and get lost on the road. product is the "Masterpiece" ke headlight. It has a parabolic re which is removable to facilitate cle A pinhole in the reflector admits li the red glass in the back. Between t flector and the red glass a funnel of c is interposed. Its object is to dist the rays evenly over the glass.

The "Lucifer" acetylene gas lamp other new lamp with a number of fe that the makers claim to have origi They have termed their system o "capillary film feed," because the wa tacks the carbide from a large surfac aluminum parabolic reflector of 7 diameter is used. It is readily rem and the focus, it was said, is acc placed and adjustable. The lower p the lamp can be removed with one

STANDARD WELDING COMPANY.

One of the most interesting exhibit a practical standpoint was that of the ard Welding Company. The welds shown indicate the great po ties of this process. A crank shaft

up of separate parts electrically welded together, when tested, fractured between the welds, which gave no indication of having suffered under the strain. It is stated that crank shafts for multiple cylinder engines can be made in this way which will be equal in every respect to solid forgings at a much smaller expenditure of time and money. An electric weld, when filed into, shows a perfectly solid and homogeneous union.

This company makes a specialty of steel welded rims of extreme accuracy, both as to size and section, the final rolling into shape being done after the welding, there being no subsequent processes to affect the rim.

Clincher and single tube rims are made in all sizes and shapes. The manufacturers claim to be the only makers of steel clincher rims in the country.

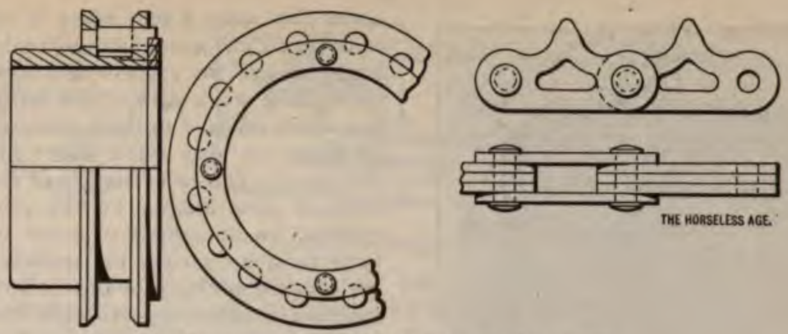
It is the intention of the Standard Company to take up the manufacture of jointless chassis frames of all sizes, with spring brackets, etc., welded on. Standard tapered channels can be cut in the middle and lengthened or shortened to suit any requirement.

THE CHAMPION MANUFACTURING COMPANY, of Brooklyn, N. Y., exhibited a number of planetary transmission gears as well as unassembled parts to show their construction. The three sizes shown constitute the company's product and are intended for 5, 10 and 15 horse power motors.

At the booth of the

AUTO SUPPLY COMPANY,

of New York, an assembled gasoline car was on exhibition. It was equipped with a single cylinder vertical motor, located under a bonnet in front, artillery wheels, wheel steering device and a touring body with individual seats. This company makes a specialty of body manufacture. The mechanism of this vehicle is strong enough to permit the installation of a double cylinder (4½x4½ inches) engine of 14 horse power. A vertical motor of this type with outside flywheel, dished to admit a conical clutch, was shown at this stand. The crank case of this engine was of aluminoid. Two single cylinder horizontal motors of 5½ and 9 horse power, respectively, were shown too. The former had a bore of 4½ inches and a 6 inch stroke, while the latter had a bore of 5½ inches and 6 inch stroke. In both cases the frames were of the enclosed type. The larger motor had a mechanically operated inlet valve. A three cylinder Vogel steam engine, which was fully described in a recent issue of THE HORSELESS AGE, constituted another exhibit. The sliding gear device that this concern is now marketing had an aluminoid case and was of the three forward and one reverse speed type. On the high speed the drive is direct. The gears were cut in such a way that they "telescope" into each other without excessive noise. Other products on exhibition at this stand were two tubular running gears, a flanged radiator of the coil



WHITNEY WIZARD CHAIN AND SPROCKET.
(Referred to in last issue.)

variety, float feed carburetors, a circulating pump and a spur gear differential.

THE HYATT ROLLER BEARING COMPANY,

Harrison, N. J., exhibited a large variety of its hollow coiled rollers and a number of bearings that were equipped with them. A rear axle of the Oldsmobile with Hyatt roller bearings was also shown. The rollers are wound cold into the shape of a helix and are of tool steel. To demonstrate the flexibility of these rollers the manufacturers displayed a large sign all the letters of which were made up out of their rollers, which were bent cold by hand and tacked to the board.

A large assortment of cold drawn steel tubing was exhibited by the

SHELBY STEEL TUBE COMPANY,

Shelby, Ohio. It comprised not only tubes of circular cross section, but various sizes of tubes of an oblong and square section. A number of coils were placed on exhibition by the company. They were of a suitable size to be employed as superheating tubes or for a similar purpose.

GRAY & DAVIS,

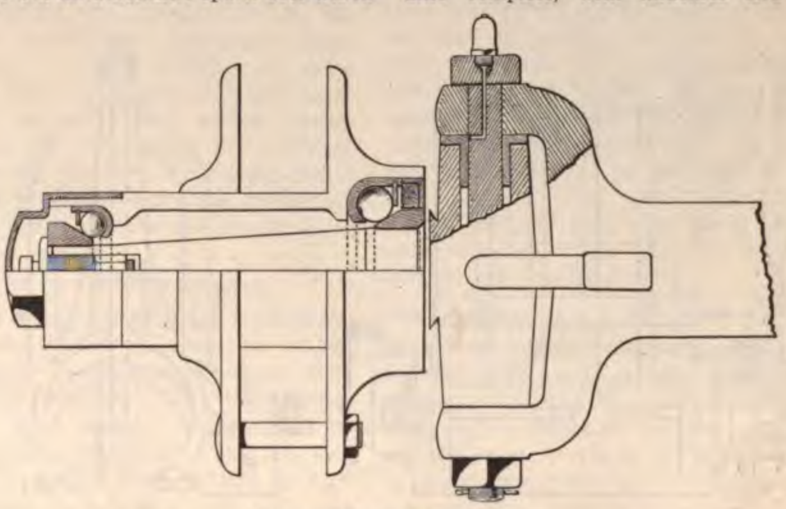
of Amesbury, Mass., made an exhibition of their acetylene gas headlights, oil side lamps, oil tail lamps and generators intended for lamps not equipped with an integral generator.

THE AMERICAN COIL COMPANY,

West Somerville, Mass., placed various current generators, spark plugs and pocket ammeters on exhibition. The company has brought out an automatic spark coil which operates both as a vibrator and a plain coil. When starting up it acts as a vibrator, giving a shower of sparks. When the motor attains a certain speed it automatically changes to a plain coil and gives a single make and break spark. The sparking device must be of the short contact quick break type. Another new product of the company's is the "Little Wonder" dynamo, which was on exhibition, too. In the base of the generator a storage system is provided, so that batteries are not required to start with. For use at a speed of over 2,000 revolutions per minute a governor is fitted. It is claimed that the dynamo can furnish current for two to three small lights at the same time that it furnishes current to the coil. A protecting cap was exhibited, which is intended as a cover for spark plugs in wet weather and obviates short circuits.

WESTON-MOTT.

Automobile wheels, both wood and wire, of all sizes were shown by the Weston-Mott Company, of Utica, N. Y., and also separate hubs, rims, spokes, bearings, steering knuckles, etc., in great variety. One of the main features at this space was a special tubular rear axle with 1⅛ or 1¼ inch driving axle, 2¼ inch ten gauge tube, gear case for gear of any size, four Hyatt roller bearings with rollers 2⅞ inches long and phosphor bronze thrust collars, trussed for both weight and chain pull. The hubs are secured by keying and also a steel pin passing through both hub and axle. A front axle complete, with knuckles and hubs,



WESTON-MOTT FRONT AXLE.

THE WHITLOCK RADIATOR.

makes a suitable mate for the rear axle, and the makers give the names of several prominent automobile manufacturers who have adopted the set as their standard.

CHARLES E. MILLER'S

exhibit was extremely large and comprehensive, including everything an automobilist could want, excepting a complete automobile. Imported horns were a conspicuous feature, and the assortment shown was a very full one. The Elgin adjustable alligator wrench was a specialty, and so was the Loeb rotary circulating pump, which was shown in operation. Rutenber motors, P. Forg's burners, boilers, generators, sprockets, chains; the Apple igniting dynamos; motor castings and parts; goggles imported from Germany; automobile clothing; electrical apparatus; lubricants, and the numberless other articles necessary to satisfy the automobilist's wants were all there, and made up a fine exhibit. The Fox valveless engine was shown running under steam.

THE WHITLOCK COIL PIPE COMPANY,

of Hartford, Conn., exhibited coiled radiators with fluted disks. The tubing of the radiators shown was of copper or of brass, and the disks were of hard, stiff copper and had an outside diameter of 1⅝ inches. A novelty is the company's new honeycomb, or cellular, radiator, which is shown in the accompanying illustration. Sheets of thin copper of a width of about 4 inches are bent zigzag and soldered together. Two sheets thus make a tube which is soldered to the lower and upper headers. A hub extends through the radiator and surrounds the starting crank shaft. This hub is hollow and is soldered to those tubes which it intercepts so that water flows through them, too. The inner section of the tube is about ⅛x4 inches. To the slow circulation, the thin sheets of water and the large radiating surface the manufacturers attribute the efficiency of this cooler. The radiating surface is approximately 80 square feet in the radiator shown, which with a suitable fan is said to be capable of cooling the water of a 20 horse power motor.

At the booth of the

BALDWIN CHAIN COMPANY,

of Worcester, Mass., all the different styles of chains manufactured by this company were displayed. The tensile stress of the lightest chain shown is 1,500 pounds, while that of the heaviest chain is 25,000 pounds. It was stated that one of the company's 1½ inch roller chains has been in service for 7,000 miles and is still in use. The Baldwin 20 horse power muffler was also shown.

THE AMERICAN ROLLER BEARING COMPANY,

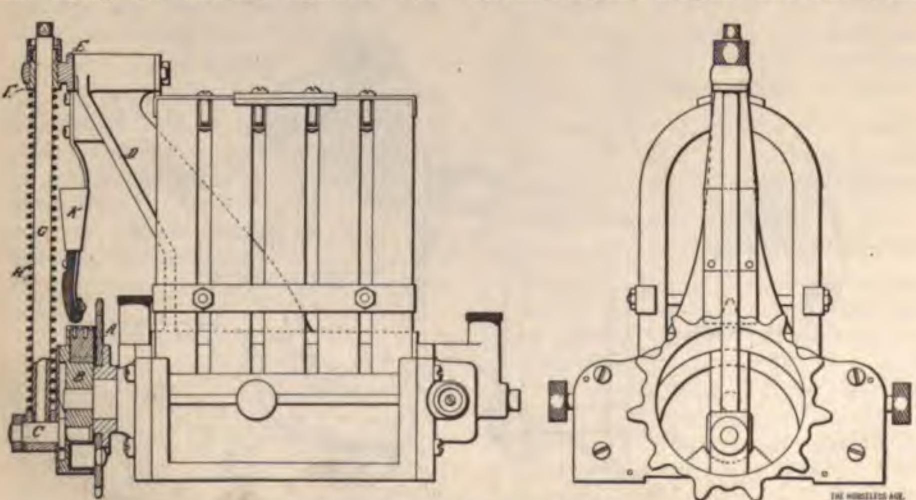
of Boston, Mass., exhibited roller bearings for ⅞—1½ inch axle ends. A number of standard hubs were shown, as well as hubs for the Midgley tubular wheels.

E. J. WILLIS,

of New York, made a display of automobile supplies and sundries, such as horns, dry cell batteries, lamps, headlights, carburetors, tires, pneumatic oil cans, leather clothing for motorists, etc. The spark plug "Bougie Herz" was shown in operation. A handsome trailer of wicker work, for use in connection with motor cycles, the new Merkel motor bicycle and the Warner differential gear were displayed also. Descriptions of the latter two will be found elsewhere in this issue.

THE MIDGLEY MANUFACTURING COMPANY,

Columbus, Ohio, exhibited some of its "Chariot" type of tubular steel wheels. One of them was provided with lugs through which the bolts that hold the large sprocket in place are put. The hubs of the



FIGS. 1 AND 2.—GOODSON MAGNETO.

WHITLOCK COIL RADIATOR.

wheels shown were of stamped steel and were brazed to the spokes. Any make of bearing may be employed with these hubs, it was stated. The makers claimed that their wheels are lighter than wood wheels of a given size.

THE ELECTRIC CONTRACT COMPANY,

of New York, displayed various novelties, such as its "Evening Star Flashlight," wire terminals, "E. R. G." dry cell batteries, gauge glass lights and a light which is provided with a bracket intended for the Jones "Speedometer."

THE BROWN-LIPE GEAR COMPANY,

Syracuse, N. Y., had eight different styles and sizes of balance or equalizing gears on exhibition. All of them were of the spur gear type and in most cases were fitted with sprockets. The company is now placing a differential on the market which is equipped with a bevel gear and pinion, and is intended for bevel gear driven machines. A wheel steering mechanism was also shown.

At the booth of the

TIMKEN ROLLER BEARING AXLE COMPANY,

Canton, Ohio, rear "live" axles with Timken conical roller bearings, stamped steel hubs for wood or tubular wheels and wood wheels were displayed. The company machines steering knuckles to fit its bearings and is marketing an artillery wheel of its own make.

THE LINDSAY-RUSSELL COMPANY

(formerly the Lindsay Automobile Company), Indianapolis, Ind., exhibited a rig with body, with wheel steering device, but without power equipment. Another similar rig was fitted up with an electric motor hung from the running gear in such a way that the motor's shaft was located at right angles to the axles. The drive was by bevel gears. A specialty of this concern's are equalizing gears driven by herring bone gears. The pinions are of steel and the large gears of the differential drum of bronze in the samples shown. A feature of this exhibit was differential cases of Whitely "Crown Steel" and tubular rear axles, the tubes of which were secured to their fittings without brazing. A 4½ horse power (4½x5½ inches) single cylinder horizontal gasoline motor formed part of the display.

THE STANDARD ANTI-FRICTION EQUIPMENT COMPANY,

of New York, exhibited several "Empire" ball bearings and "Be-No-Ca" cushion tires. The latter are made in the following sizes: 28x2½, 30x2½, 28x3 and 30x3 inches.

JOSEPH DIXON CRUCIBLE COMPANY, City, N. J., had cans of its various ting graphite compounds and "No. aphite, as well as its pipe joint com- on exhibition. The family of lubri- compounds is composed of Dixon's e greases, "Graphitoleo" and Dix- otor chain compound. The latter roduced but recently. It consists of al lubricating graphite and mineral imal materials and is marketed in oblong cakes of about 3 pounds

ODSON ELECTRIC IGNITION COMPANY, ovidence, R. I., exhibited at the one of their magneto generators for n purposes and the accompanying ically operated spark plug. Draw- these two devices are shown here- Figs. 1 and 2 represent a side and vation of the magneto respectively, g. 3 a section and two end views of ug. The magneto is of the usual iction with laminated field magnets armature enclosed. On one end of nature shaft is supported a sprocket A, which is loosely supported upon ft. Outside the sprocket a disk B d to the shaft, this disk being pro- with a crank pin C and a ratchet ar- ent by which the disk and the shaft rotated from the sprocket for a cer- rt of revolution and then released om. From the armature casing of gneto rises a strong bracket D, the end of which forms a bearing for a supporting a guiding sleeve F. h this guiding sleeve pases a tubu- l G which has bearing connection e crank pin C. The rod G is sur- d by a strong coiled spring H. The et A is driven from the engine by of a chain. It engages the crank at a certain part of its revolution tates the same and the armature the pressure of the spring H. When nk pin C reaches the highest part ourse the crank disk is tripped, and ergy stored up in the spring H the armature to move ahead in ad- of the sprocket, at a high speed, induces a current impulse of suffi- tensity to give a hot spark in the r. The armature of the magneto one revolution for every spark pro- and requires no commutator. The depending from the top of the D serves the purpose of lubricat- tripping mechanism.

plug consists of a metal base A which a double pole electric magnet tened. To the poles of this magnet ed an armature C, an extending arm ch forms the movable electrode of g. This electrode is normally held act with the stationary electrode D pressure of the coiled spring E. l of the electromagnet B is inserted uit with the armature of the mag- nerator, and when the impulse of generated by the magneto rises, the pole magnet B becomes strongly magnetized and attracts the armature C against the pressure of the spring E, thereby causing a break in the circuit between the terminal C and D and producing a spark which ignites the mixture in the cylinder. When the circuit is broken the current, of course, ceases to flow, the magnetism of the electromagnet B dies down and the spring E again forces the terminal C into contact with the terminal D, ready to receive a new impulse of current. The electromagnet is protected by a sheet metal cap.

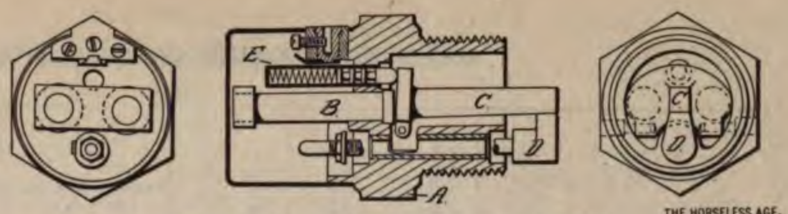


FIG. 3.—GOODSON MAGNETIC SPARK PLUG.

As the current impulse is virtually generated by the energy stored up in the spring, it is independent of the speed of the engine, and the same size of spark is obtained when starting the engine as when under normal running conditions.

Tire Exhibits.

HARTFORD RUBBER WORKS COMPANY.

The Hartford single tube and the Dunlop double tube tires are both well known and require no description here. No apparent changes have been considered necessary in this year's product. The list includes everything from the lightest bicycle racing tire to the heaviest tire for touring automobiles. The Turner solid tire is also shown in various sizes.

THE G. & J. TIRE COMPANY

showed a complete line of their detachable tires. No radical changes have been made, though the various processes of manufacture have been refined and improved. The general features of the G. & J. tire are well known.

STANDARD ANTI-FRICTION COMPANY.

The Be-No-Ca tire, better known as the Beasley elastic tire, manufactured by the Standard Anti-Friction Equipment Company, has a central cellular air space which is intended to give sufficient hardness to support a load without undue flattening, while permitting the resiliency necessary for comfort, without the use of air under pressure. Punctures, of course, have no effect and the tire can be used until worn out.

THE FISK RUBBER COMPANY

is turning out a detachable tire in which the air chamber is entirely above the clamp, giving great resiliency. The inner tube cannot be pinched. The tire cannot roll or creep, and is easily detached and replaced, a wrench being the only tool needed. A special fabric is used in Fisk single tube tires, having a tough warp and a soft filling. More rubber is used than in last year's tire, and one layer less of fabric. With the exception of the Dunlop the Fisk tire is the only detachable tire which can be used in Great Britain, all others, it is stated, infringing the Dunlop patents.

THE GOODYEAR TIRE AND RUBBER COMPANY

exhibited some very heavy tires, both solid and pneumatic, and also their notched tire, which is said to be achieving considerable success; also Goodyear detachable flange tires and clincher tires. Detail improvements have been made wherever possible, though the main features remain unchanged.

THE DIAMOND RUBBER COMPANY

claim to have evolved a process of manufacture whereby sulphur is entirely eliminated from the rubber used in their inner tubes, improving the quality of the material and preventing "bloom" on the surface. Patches can be applied without the necessity of elaborate cleaning, and will stick better, owing to the absence of "bloom" or dust. Diamond tires are made in all shapes and sizes, for every variety of use.

THE FIRESTONE TIRE AND RUBBER COMPANY

make solid rubber tires only, and claim superiority, owing to the peculiar method of manufacture. The tire is molded in a 12 inch continuous coil and cut off to the required length. When the coil is opened out to the diameter of the wheel the tread is compressed, making the rubber dense, self healing when cut and durable. Side wires are used to attach these tires, the wire holding the tire by steel crossbars inserted laterally near the inner side at regular intervals. No internal wires are used.

THE METALLIC RUBBER TIRE COMPANY

demonstrated the non-slipping qualities of their tires by placing two wheels, one fitted with an ordinary tire and the other with a metallic tire, side by side on a block of greasy asphalt, pressure being applied to the wheels and handles being attached to each so they could be "skidded" by hand and the difference in the force required noted. The tread of this tire is studded with steel rivets placed close together, which bite into the road surface and prevent slipping.

THE INTERNATIONAL A. & V. TIRE COMPANY

showed pneumatic, solid and cushion tires for automobiles and carriages. Their "Endurance Tire," the air space in which is only slightly larger in diameter than the wall thickness, is said by the makers to be as reliable as a solid tire. A special fabric and method of manufacture is said to prevent entirely all injurious friction.

DATA OF GASOLINE CARS AT THE SHOW.

	Stevens-Duryea.	Duryea Three Wheeler.		Packard Motor Car Co.		Winton Motor Car Co.	Ward Leonard Electric Co. (Type C 43.)	International Motor Car Co.		
Horse power	7	10	......	12	25	20	24	24	18	12
Number of cylinders	2	3	......	1	4	2	4	4	3	2
Bore and stroke	4¼x4½	4½x4½	......	6x6½	......	......	......	4¼x5¼	4¼x5¼	4¼x5¼
Motor—front or rear	Rear.	Rear.	......	Rear.	Front.	Rear.	Front.	Front.	Front.	Front.
Engine speed (normal), R. P. M	600	900	......	850	......	......	......	900	900	900
Horizontal or vertical	Hor. op. cyl.	Inclined.	......	Hor.	Vert.	Hor. op. cyl.	Vert.	Vert.	Vert.	Vert.
Inlet valve—suction or mechanically lifted	Suction.	Suction.	......	Suction.	Suction.	Suction.	Mech.	Suction.	Mech.	Mech.
Hand or foot control—throttle, adv. spark or accelerator	Throttle Spark.	Lift of inl't valve.	......	Lift of inl't valve.	Accel. Spark.	Throttle Spark.	Accel Spark.	Accel. Spark.	Accel. Spark.	Accel. Spark.
Governor—how acting	......	......	......	......	Lift of inl't valve.	......	......	Throttle.	Throttle.	Throttle.
Jump spark or hammer break	J S.	H. B.	......	J. S.	J. S.	J. S.	J. S.	J. S.	J. S.	J. S.
Clutch or sliding gear	Clutch.	Clutch.	......	Sl G.	Sl. G.	In. Cl't'h.	Sl G.	Sl. G.	Sl. G.	Sl. G.
Direct drive to bevel gear on rear axle	......	......	......	......	......	......	......	......	......	......
Live rear axle or solid stationary	Live.	Live.	......	Live.	Live.	Live.	Stat.	Stat.	Stat.	Stat.
Speed changes—forward, reverse	3—1	2—1	......	3—1	4—1	2—1	3—1	3—1	3—1	3—1
Axle bearings—front	......	Ball.	......	Plain.	Plain.	Ball.	......	Ball.	Ball.	Ball.
Axle bearings—rear	......	Plain.	......	Plain.	Plain.	Roller.	......	Ball.	Ball.	Ball.
Frame of car—steel, wood or combination	Tubular.	Comb.	......	Steel.	Comb.	Steel.	Comb.	Comb.	Comb.	Comb.
Wheel base	69	67	......	88	96	90	90	94	84	76
Size of tires	28x3	30x3 36x3	......	34x4	36x4	32x4	34x3½	34x4	32x4	30x3½
Weight of car complete, with tonneau	1,050	Phaeton. 850	......	Tonneau 2,200	Tonneau. 2,500	Tonn'u. 2,100	......	Tonneau 2,800	Tonn'u. 2,600	Tonneau 1,800

Data on Gasoline Touring Cars.

By J. G. Perrin.

Believing a comparison of data on the leading or representative types of so called touring cars, exhibited at the recent Show, compiled in tabular form, would be interesting, as well as instructive, I have endeavored to obtain the following information from exhibitors or their catalogues.

Figures lacking are owing to dearth of specifications published in catalogue or to lack of information of salesmen.

Upon analyzing these figures we find there seem to be two distinctive types of touring car, the lighter car, with engine power of about 12 horse power, and two cylinders, and the high powered, high speed machines of four cylinder engine of 24 horse power or thereabouts.

The relation of bore and stroke to rated horse power varies considerably with the different makes. There were several exhibitors who increased their figures 3 or 4 horse power when they found out what the other makers were claiming. Evidently the former rating was increased by the pressure of New York city "hot air."

One firm claims 25 horse power for a two cylinder engine of 5 inch bore by 4½ inch stroke, normal speed 2,000 revolutions per minute. This is equivalent to a piston speed of fifteen hundred feet per minute.

As regards engine position we notice a decided preference for the vertical engine in front. The American makers fought hard against this public demand, but practically all the new entries into the manufacturing business have adopted this type, and many of the older makers also. While this type will evidently predominate for some time, in this class of car, on account of its accessibility and better disposition of motor for tonneau bodies, yet as far as smoothness of running is concerned, no arrangement could be more desirable than the double opposed cylinder, horizontal engine used by several of the makers embraced in the above list.

While on the subject of accessibility, it is pleasing to note the successful efforts of many designers to make every part of their cars as easy to get at as possible. In the Columbia gasoline car, for example, each inlet valve cage is held in place by a screw cap, with a mutilated thread (after the style of the breech block on modern breech loading cannon), so that by an eighth turn of said cap, by means of a handle direct connected to it, the cage is released and can then be removed. The same idea is employed on the spark plugs.

Under the division of transmission devices the sliding gear system is in the majority, the tendency being towar drive.

In this line the idea employ transmission of the F. I. A. T. c ing the gears always in mesh a ing speed, by means of internal panding into the gear wanted, gest further development.

Several of the lighter touring direct bevel gear drive to a diffe a live axle (after the style of th Richard car), but only one or tv used this arrangement on thei machines, claiming the cross co with chain drive on rear wheels with solid axle, to be better prac looks true enough, but the fact of the foreign makers of heavy adopted it is indicative of furthe ments along this line. The N in which Edge won the Gordo cup last year was so equipped.

As regards wheel bearings, o lect any one of the three types ball, roller or plain—and find good company. It is rather s however, to note that many used ball and roller bearings using the plain. On account of lower coefficient of friction than bearing, the roller bearing is ing, and it is hoped

DATA OF GASOLINE CARS AT THE SHOW.

Moyea Auto. Co.	S. B. Bowman Auto. Co. (La France Auto.)	Pan-American Motor Co.	The Locomobile Co.	Berg Automobile Co.		Peerless Motor Car Co.		Autocar Co.	Searchmont Auto. Co.	Long Distance Auto. Co.	Auto Motor Co., Springfield, Mass	Haynes-Apperson Co. (Runabout.)	Haynes-Apperson Co. (Surrey.)	Apperson Bros. (Class A Touring Car.)	H Bartol Brazier, Philadelphia, Pa.	F. I. A. T. (Italian Car.)
16	20	......	16	15	8	16	24	10	10-14	12	18	8	12	24	15	16
4	4	4	4	4	2	2	4	2	2	2	4	2	2	2	2	4
x5½	......	......	4x5	4x5	4x5	4½x5½	4x5	3¼x4	4½x5	5x6	......	4⅜x5	5x6	5¼x6½	5x6	4x5
ont.	Front.	Front.	Front.	Front.	Front.	Front.	Front.	Front.	Front.	Front.	Front.	Rear.	Rear.	Front.	Front.	Front.
.....	900	......	900	800	800	800	800	1,200	......	600	......	900	750	......	800	900
ert.	Vert.	Vert.	Vert.	Vert.	Vert.	Vert.	Vert.	Hor. op. cyl.	Vert.	Vert.	Vert.	Hor. op. cyl.	Hor. op. cyl.	Hor. op. cyl.	Vert.	Vert.
ction.	Mech.	Suction.	Suction.	Suction.	Suction.	Suction.	Suction.	Suction.	Suction.	Mech.	Suction.	Suction	Suction.	Suction.	Suction.	Suction.
ccel. park.	Throttle Spark.	Accel. Spark.	Accel. Spark.	Accel. Spark.	Accel. Spark.	Accel. Spark.	Accel. Spark.	Throttle Spark.	Accel. Spark.	Accel. Spark.	Throttle Spark.	Throttle Spark.	Throttle Spark.	Throttle Spark.	Accel. Spark.	Accel.
rottle.	......	Throttle.	Throttle.	Throttle.	Throttle.	Throttle.	Throttle.	......	Throttle and Spark.	Throttle	......	......	......	......	Throttle.	Throttle Spark.
J. S.	J. S.	J. S.	J. S.	J. S.	J. S.	J. S.	J. S.	J. S.	J. S.	H. B.	J. S.	H. B.	H. B.	H. B.	J. S.	H. B.
Sl. G.	Sl. G.	Sl. G.	Sl. G.	Sl. G.	Sl. G.	Sl. G.	Sl. G.	Sl. G.	Sl. G.	Clutch.	Clutch.	Clutch.	Clutch.	Sl. G.	Sl. G.	Sp'l imp. dogs.
......	......	......	......	......	Yes.	Yes.	Yes.	Yes.	......	Yes.	......	......	......	......	Yes.	......
Stat.	Stat.	Stat.	Stat.	Stat.	Live.	Live.	Live.	Live.	Stat.	Live.	Live.	Live.	Live.	Live.	Live.	Stat.
4—1	4—1	3—1	3—1	4—1	3—1	3—1	3—1	3—1	4—1	3—1	3—1	3—1	3—1	3—1	3—1	......
Ball.	Roll.	......	Plain.	Plain.	Plain.	Ball.	Ball.	Roller.	Plain.	Plain.	Ball.	Roll.	Roll.	Plain.	Roll.	......
Ball.	Roll.	......	Plain.	Plain.	Plain.	Ball.	Ball.	Roller.	Plain.	Plain.	Ball.	Roll.	Roll.	Plain.	Roll.	......
Comb.	Comb.	......	Steel.	Comb.	Comb.	Steel.	Steel.	Comb.	Comb.	Steel.	Comb.	Steel.	Steel.	Comb.	Comb.	Comb.
88	84	......	82	90	78	84	100	74½	81	80	84	69	102	90	85	......
32x4	36x3½	34x4	34x3½	34x4	32x3½	34x3½	34x3½	30x3	32x3½	30x3½	30x3½	32x3	36x4	36X4	36x4	......
Tonn'u. 1,900	Tonneau 2,500	......	Tonneau 2,100	Tonn'u. 2 200	Tonneau 1,650	Tonneau 1.850	2.400	1,450	2,250	2.100	1,690	Phaeton. 1,300	Surrey. 2 100	2,650	2.650	2,200

designs (the Hyatt flexible roller and the Timken adjustable conical cage, for instance) may prove successes.

The figures for the length of wheel base show an increase over last year's on account of the more comfortable riding qualities over rough roads. For the same reason larger wheels and tires are being fitted, and with the wood wheel so far in the lead the wire wheel is practically obsolete.

This year's exhibit showed most of the American makers employing an armored wood framework (combination wood and steel), but the appearance of a few foreign cars, Mors, Mercedes and Clement, with a chassis framework of pressed steel, was so pleasing and the material so suitable for the purpose that it is safe to prophesy that next year's exhibit will show the majority of the chassis so constructed, especially if some enterprising American gets out tools for producing such a girder frame, with necessary connection, for the trade and in quantities.

This and other things will ultimately result in dimensions being adopted for a standard under body so that upper bodies may be made to a standard, thus decreasing cost and facilitating assembling.

The jump spark method of ignition is ad by a safe margin. The mechanical details have been much improved by using more substantial plugs, better coils and more effectively insulated wire for the transmission of the high tension current.

In this connection the Eiseman magneto outfit offers possibilities of disposing of the battery entirely, simplifying the wiring and cheapening the adaptation of the jump spark system to a multi-cylinder engine.

As regards prices there is a large variation, but a man is getting more for his money by getting one of our best, high priced American cars than he would by selecting many of the foreign cars at the ofttimes inflated values.

A. M. L.'s Annual Meeting.

The annual meeting of the American Motor League was held on January 22 in the Assembly Hall, Madison Square Garden. Isaac S. Potter, New York, ex-president of the League of American Wheelmen, was elected president. The other officers were re-elected as follows: Charles E. Duryea, Reading, Pa., first vice president; W. G. Murray, Chicago, second vice president; F. B. Hill, Boston, treasurer, and S. W. Merrihew, New York, secretary. The reports of the various officers were submitted and plans were matured to extend the usefulness of the League.

The following resolutions were offered and passed:

Whereas, A bill has been introduced in the Connecticut Legislature providing for the change of the speed limit for automobiles from 15 to 8 miles per hour and in other ways imposing restrictions upon the use of these vehicles;

Resolved, That this association express its disapproval of the measure in view of the entirely satisfactory working of the present automobile law, and use its best endeavors to prevent its passage.

Whereas, A bill has been introduced in the New Jersey Legislature providing for a licensing system for automobilists, who are obliged to take out a license, undergo an examination and pay a fee of $5;

Resolved, That this association express its disapproval of said measure and endeavor to bring about its defeat.

It was ordered that copies of these resolutions be drafted and sent to the Legislatures of these two States, and that the members of the League resident in these States be requested to personally protest through their legislators against the measures.

An adjournment was taken to the Chicago Automobile Show, February 14 to 21, the time and place of meeting to be announced hereafter.

VIEWS ON THE SHOW.

INTERVIEWS WITH EXHIBITORS AND VISITORS.

Following are some views on the Show and its lessons by readers of THE HORSELESS AGE, manufacturers, dealers and users:

GEORGE M. BROWN, OF HARTFORD, CONN.,

a well known automobile enthusiast, was most liberal in his praises of all the manufacturers, taking them collectively and individually, and was most positive in his belief that there was only one sort of machine in the world, and that was made and sold in the United States of America.

He had just returned from a tour around the big Show and was sitting in the Haynes-Apperson booth when THE HORSELESS AGE representative approached him and engaged in a conversation relative to the Show. "It goes without saying that this is the biggest and the greatest show that has ever been held in America," he said. "There are so many machines in the field and so many really good ones that it is a trifle hard for a man to decide just what particular one he wants and to overcome the natural desire to buy them all.

"It is evident to one who has followed up automobile improvements closely that the younger concerns have very wisely profited by the experience of the older ones and have adopted many of the improvements which are rapidly becoming standard on all machines constructed on this side of the Atlantic. The older concerns, on the other hand, have retained all that which was good on their previous models and spent their energies on strengthening the parts experience and hard usage have proven to be weak, and improving small details such as will add to the convenience of their machines rather than mean any radical advance or departure in the working parts.

"It is pleasing to see that the general designs and finish of the American machines is improving, and in many cases is superior to the French. All classes are gradually drawing toward the French tonneau type in appearance, and getting away from the baggy and clumsy lines which distinguished and disfigured the homely models of a few years ago.

"It is surprising to note the great interest in the exhibits displayed by people who are not and never will become auto cranks. I know from personal experience at this Show that many people widely separated in their daily endeavor from the automobile field have been looking over the machines technically, and have become enthusiastic, in fact so much so that they have placed orders for cars, and I feel sure that they had positively no idea or intention of doing so when they first came into the exhibition.

"I myself am a firm believer in the American automobile, and I know of half a dozen American types that will give French machines of much greater horse power and of double the price a good rub any day in the week. I have often done this myself in a 10 horse power machine with a double cylinder opposed motor, and I feel confident that I can do it again.

"The foreign made machine is no doubt preferable to a certain class, because the society people think that it is the proper thing, and for that reason will stick to it as long as the fad lasts. But as far as actual running qualities are concerned the foreign made machines are not at all superior to the American cars, and as for paint and finish, they are not in it at all.

"The French make a nice engine; that is a conceded fact, but labor is cheaper over there and they can afford to put more time on the fine work. American workmen can do as good work as any in the world, but they are paid more for it, and in order to compete the manufacturer in this country must depend on machine work to a great extent.

"When it comes down to a question of motors—and, after all, it is the motor that really makes the machine—I am in favor of a water cooled system. I would rather depend on a good gear driven pump any day in the week than on the best fan and air cooling arrangement ever constructed. Of course, we all have our own ideas about these matters, and that is the way I look at it. I know that if I get out on the road and my water heats up I can cool it off with a little cold water and go on again for 10 or 12 miles, but if an air cooled motor gets hot there is no telling when it will cool again. I believe that the air coled system will work and is practical when all conditions are right for it, but the trouble is that we cannot always have all conditions just right."

Mr. Brown realized the demand for the popular priced touring car and was of the opinion that in a year or so a machine that will meet all demands would be put on the market.

"This exhibition has been the means of showing the public what the automobile really is," he said in conclusion, "and it will do much toward popularizing horseless vehicles and making known the cause and effect of horseless motion among all classes of people."

DR. T. J. MARTIN, OF BUFFALO, N. Y.,

president of the Buffalo Automobile Club, was much in evidence at the Show, viewing the various exhibits with the critical eye of an expert, as his knowledge of horseless vehicles and their construction is large and comprehensive.

In describing the Show his words were: "The exhibition was certainly a marvel and was an improvement of 100 per cent. over last year's Show. It plainly demonstrated the fact that the American inventors and manufacturers intend to be in the foremost ranks in automobile building, as they are in every other line, and at the prese[nt rate] they will achieve that desire before a year is past. It is purely only a qu[estion] of time when the American product [will be] as desirable and as much sought after [as the] foreign machine, and a very short t[ime at] that.

"The enthusiasm of visitors at the [Show] was positively remarkable and the n[umber] of actual buyers who were ready t[o place] their orders and back them up wit[h] deposits was surprising.

"The popular demand seems to b[e this] year for a medium priced touring [car of] about 2,000 pounds, and that mach[ine is] being furnished by a number of ma[nufac]turers. Many are making the m[istake], however, of putting in motors muc[h too] small for the work that they will h[ave to] do and no more serious mistake tha[n this] could be made.

"It is my opinion also, a mistake t[o con]struct what is known as the convertib[le]. A machine should be designed to [carry] either two or four persons, and there [should] be no compromise about it.

"When a machine is designed to [carry] two people it is too light for four, a[nd the] mistake of the dos-a-dos seat on ligh[t run]abouts is testified to by the thousa[nds of] racked machines to be found in all pa[rts of] the country today. If the machin[e will] carry two or four persons it is eith[er too] light for four or too heavy for two pe[ople.]

"If a man wants a touring car he [should] buy one capable of carrying the num[ber of] people he intends to pile into it, bu[t it is] unfair to expect a machine design[ed to] carry two persons to do double that a[mount] of work, and it is rather foolish for [manu]facturers to encourage users to ov[erload] their cars in doing it.

"The coming machine, I believe, wi[ll] be fitted with a high speed motor[; that] is, one that turns at not more than [...] revolutions a minute. You have, no [doubt,] noticed that the manufacturers of n[otors] that go faster than this say little abou[t the] speed, for the rack of these very high s[peeds] means sure destruction to recipro[cating] parts and bearings.

"A powerful medium priced car is [what] the great majority of the people wan[t, and] that type is rapidly forging to the [front.] The Show has done much to popula[rize] and to help along greatly the cau[se of] horseless vehicles and their use."

Perhaps one of the most enthus[iastic] automobile users at the Auto Sho[w was]

E. A. FAIRCHILD,

a well known stock broker and [mem]ber of the Stock Exchange, [who] was present every afternoon and [even]ing at Madison Square Garden [from] January 17 until the doors close[d on] the 24th. Mr. Fairchild has bee[n the] owner of half a dozen machines of v[arious] types and makes and has thousan[ds of] miles of road experience to his credi[t.]

He had no eye for the imported [car] and was wrapped up, heart and so[ul, in] the American creation. In speaki[ng]

THE HORSELESS AGE representative he said: "There is no machine in the world but the American made car. It beats them all every time, and by this time next year I firmly believe that the Yankee will 'skin 'em all' with his automobile, both for speed and for durability. The American made machines are rapidly getting a name for themselves and they stand up better than the French cars when it comes to rigid tests and hard usage, not on sand-papered roads, but over cobbles and up hill and down.

"There are a certain class of buyers who have more money than they know what to do with and who want the French cars because society has decreed that they are the proper thing. The imported machines, I contend, are not any better than those made right here in America, and in many cases they are not as good.

"We do nothing but talk automobile at the Stock Exchange now, as things are slow and there is scarcely enough business to keep us out of mischief. Everything is American made machines down there, and there is a rapidly growing sentiment in favor of air cooled motors. For my part, I wouldn't have any other, and I have learned from experience that when you eliminate the water and the water pump you do away with a great percentage of automobile troubles.

"I have toured hundreds of miles over all sorts of roads and under all sorts of weather conditions with my air cooled machine, and I have yet to experience a heated cylinder. I cannot say as much for water cooled machines I have owned.

"My idea of a car for use on American roads is an air cooled machine of about 10 horse power, convertible into either a two or a four passenger car, capable of a speed of 20 miles, an hour, and that will climb ordinary grades on the high speed.

"It is really surprising at this Show to note the improvements that have been made since last year both in finish of bodies and more particularly in finish of machinery. It is evident that the manufacturers are giving more attention to strengthening the small reciprocating parts, which were to a great extent neglected last year. This is a big thing, as it will mean longer life for the machines and better service for the owners. The ideal car is not far off now, and before two seasons have passed I see no reason, judging by the present rate of advancement, why the American automobile should not be the best in the world and in every way capable of supplanting the horse and keeping him supplanted."

BENJAMIN SMITH,

a well known Boston agent, connected with the store of H. B. Shattuck & Son, and who was prominent in the Boston-New York contest, operating car B 43, advanced a rather novel argument, stating that in his opinion the Auto Show was a most deceiving exhibition as far as the buying public was concerned. "There were a number of machines exhibited there that are the first ones that have ever been turned out," he said. "There is no reason to believe that they are going to stand up under the rigid test of everyday road work, and as far as is known some of the manufacturers may never turn out another car. Of course, there is no way of making a concern guarantee that it is all right and intends to continue doing business, but there are many so called manufacturers who have no factories and who buy their parts and bodies and assemble them in a shed somewhere.

"The Show in itself has, no doubt, been a great success and it has done no end of good in popularizing the automobile and bringing it into the limelight of publicity. The week's business was very good and many machines were sold that perhaps otherwise might not have been disposed of. The improvements in all the standard makes have been remarkable, and it is my opinion that the American automobile is fast reaching a position that will place it on a level with the foreign made car in strength, speed, durability and grace of lines. We are making the right effort in the right direction, and it is only a case of following the old motto: 'Keeping everlastingly at it brings success.'"

CHARLES E. DURYEA.

"The people were simply hungry for information. They grabbed for circulars and reading matter; last year we had to force it upon them. The American type is growing in popularity. I do not see so many people hanging around the large foreign tonneaus; last year they clustered about them to the exclusion of everything else. The call is going to be for carriages, not huge road machines. Next year's business will be enormous, limited only by the ability to turn out goods. One very gratifying feature is that the parts makers are waking up in grand style. It is not so many years ago that I made inquiries at the Electrical Show, held at the Grand Central Palace, in New York, for a magneto that would spark an automobile engine. They had nothing to offer, and could only get up something that would answer the purpose after considerable experimenting, which would cost me, one man said, perhaps $500. Today they send me sample magnetos to test, and it's much the same with other accessories. I believe the rush to put on mechanically operated inlet valves, because so many are doing it on the other side, is a mistake. There are certain things a mechanically operated valve will do, but it will not do some things the automatic valve does. I still believe in the primary spark, and the fact that some of the foreigners are adopting magneto and primary sparks shows that this system will soon be still more popular. The tendency toward purchase of a very light machine for runabout for ladies and children and for a run downtown, or to the depot, etc., is bringing forward the air cooled motor, and we may look for considerable development in air cooling practice. The talk of licensing operators of motor carriages is all a farce, except when applied to the very heavy machine. The automobile must be made for use by all members of the family, and it is going into many families who cannot stand the extra expense of paying for licenses and other unnecessary things. Tire makers should supply corrugated tires for winter use and insist upon the people using them. They are away ahead of the smooth tire. What's the use of wrapping tires with rope, etc.? Use the corrugated tire and the 'rope' is already there, right in the rubber."

H. A. KNOX.

"The people have certainly done considerable reading and thinking during the past year. They are much more enlightened than they appeared at the last Show. Especially on the principles of the gasoline car have they well posted themselves. This was the most complete Show I ever attended. Nearly all the older makes show genuine improvement, but there has been a wonderful advance made in body making, both in workmanship and style. Some of the newer entries into the industry show inexperience in certain parts of their product. The importance of air cooling is appealing to the people. Have had very few requests to explain the difference between the gasoline and steam systems. One very pleasing feature with us has been the efforts of satisfied customers to sell their friends machines of the same make as theirs. They would bring their friends in and work as hard in convincing them as if they were obtaining a commission for their sale, and I will say that fully half of our direct sales have been made through the influence of these customers. One thing I have particularly noticed is the great number of people who read the automobile press. Frequently I have quoted something from the columns of THE HORSELESS AGE, only to fine that it had already been noticed by my hearer."

E. A. GILMORE.

"I had no idea it would be such a large display; am much surprised at the advance that has been made both in mechanism and body building. A feature was the great interest the people took in everything; they stopped to ask questions instead of passing by. I am afraid the late comers did not secure machines; the business that was done there was enormous. It is my impression that the New England States furnished the largest number of visitors to the Show. It was undoubtedly a gasoline show."

PARK DENSMORE.

"This Show illustrated the greatest and most rapid advance in an industry that has ever been seen. In the mechanisms exhibited there was embodied a degree of efficiency that could not have been realized a year ago.

"In matters of detail and general equipment, the showing made was more like

that of an industry that has been in existence ten times as long as the automobile industry.

"A like advance in another year seems hardly conceivable, but there are a great number of master minds working on the problems and results can only be awaited."

H. BARTOL BRAZIER.

"Another demonstration of mechanical progress; another stone in the arch of success. From what was shown at this exhibit, it will be but a short time before American builders will have no peers in the automobile business. Shipments of carriages to the other side are on the increase.

"The criticism is often made that American makers copied many valuable points from the French builders. It is pardonable to copy a good thing, but we must not lose sight of the fact that many parts developed by the American manufacturers show great superiority for American roads. Many intending purchasers with plenty of money, while thoroughly satisfied with the appearance and mechanical details of a $2,000 or $3,000 American car, passed it by on the ground that it "had not been as thoroughly tested out as the foreign productions," and finally purchase a foreign car of the same power at from $6,000 to $8,000. One thousand dollars would have been ample to remedy any defects that might have developed in the American car, which would make its total cost less than half of that they paid for the foreign car, and the chances are that under the severe conditions imposed by our American roads the foreign car will need the most money for repairs. A little more support extended to the American builder will soon put our vehicles well in the lead. Viewed financially and in the number of visitors, the show was a huge success."

GEORGE H. BROWN, CLEVELAND.

"A very successful Show. Great deal of improvement to be seen in all kinds of cars. Big cars seemed to be in more favor than medium weight cars for touring purposes. Wood wheels have the call. People have taken to the gasoline rig, and there is very little talk as to the merits and demerits of the different motive powers."

GEORGE W. CONDON, NEWARK, N. J.

"It was certainly a great Show. The tendency seems to be, with a few exceptions, toward French practice and higher prices. Many noticeable improvements in air cooling systems, but the problem is not yet solved. Another year or two will undoubtedly witness great strides in air cooled motors.

"Before the automobile becomes popular with the great mass of people there must be a drop in prices, but at the same time this must not be accompanied by any sacrifice of strength and efficiency."

HENRY S. CHAPIN, ROCKVILLE CENTRE, L. I.

"The tendency, both at the Paris Show and here, is away from the high powered car that cannot go slow to the medium speed car, preferably with throttle control. If any one thing stands out more prominently than another it is that great efforts have been made to provide comfort for passengers. In arrangement of seats, upholstering, spring suspension, protection from inclement weather, ease of handling and ability to travel at moderate speeds, everything is toward comfort. It was a great Show, and there is but one criticism I have to make. This great management should have provided police supervision for vehicles left standing in the street. Vandals have taken advantage of the opportunity and several cars were seriously tampered with. Small boys have climbed all over them, damaging the finish; many horns have been stolen. It was a wonder that the lamps were allowed to remain. Some sort of a checking system, with police protection, should be provided at all future shows, and while this would cause a little more work and trouble for the management, it would be worth a great deal to everyone who is compelled to leave vehicles outside the building, and, like the stitch in time, would prevent the commission of mischiefs of a more serious nature than those so far noticed."

ELMER APPERSON.

"The large number of people rushing pellmell into the automobile industry is alarming. It appeared to me that there were about four times as many builders of high powered cars exhibiting there as will find a market for all of their product. Several of the large, well equipped factories in this country today are able to supply the needs of the public for some time to come. Prospective buyers were so confused at the large number of cars exhibited that they went away without buying anything. The low priced cars were bought mostly by agents. There is a decided tendency among the oldest owners and users to buy from the older makers.

"Chains, rims and tires are being turned out in much better shape than last year. Four and one-half inch tires can now be obtained that will duplicate on the wheel; but parts in general have yet to be much better standardized."

KENNETH A. SKINNER.

"It was a wonderful improvement over last year. I saw the Paris Show and I must say that I really think that the strides made over here are greater than in France; the Paris Show, of course, was far in the lead, but the rapidity of our progress much more marked. In connection with this we must acknowledge that American makers have had the advantage of seeing the foreign models and all that was necessary was to successfully copy. There are very few models with motor in front construction shown here that are not foreign copies. But why not copy? I do not blame them at all. They are good things to copy.

"The proof of the pudding with automobiles is in the using of them; therefore I do not consider that for demonstration purposes the short run on level street pavements at all satisfactory. Nothing less than 100 or 200 miles over rough average roads should be accepted as a proper demonstration. I must say that many of the copied French machines shown there looked fully as well as the originals. There were a number of models shown at the Garden that will not be heard of several years hence; they are too intricate and too heavy. I believe they are not made except to sell to millionaires. A machine of 15 horse power and weighing about 1,500 pounds will give more satisfactory service on our American roads than the heaviest and highest powered car they can produce in this country or Europe. I believe the manufacturer now engaged in spending his time and money in producing the heavy, powerful machines will soon be out of business unless he adds a lighter model to his line. It would be all very well if we had roads like those of France, but even then the dead weight is there and the rapid wearing out of tires, which is the largest item in the expense account at present.

"It is my opinion that it will narrow down to about three sizes within five years, with a standard of, say, 100 pounds to the horse power. There will be a single cylinder of about 6 horse power for the runabout; a double cylinder of 10 horse power for the surrey or tonneau, and a long distance touring car of 15 or 20 horse power. More power on touring cars will be superfluous and we may look to see nothing but the strictly racing machine employ over 20 horse power. There is no comparison with last year's Show in the understanding displayed by the public."

R. D. ALLIGER, JR.

"It was the largest Show outside of Paris and London, and the only thing we need is a more roomy building to give a larger one next year. The manufacturers have every reason to be proud of their efforts during the past year in improvements shown on their cars. The greatest improvement I have noticed is in transmission gears and motors and in increased comfort in riding by use of larger bodies, longer springs and better upholstering. The tendency in construction is toward the vertical motor in front with shaft and bevel gear drive; also more simplicity in arrangement of levers. I also think some of the manufacturers have found they have not made any money at last year's prices, therefore there is a tendency to raise the prices of the larger cars."

JAMES J. BRADY, DETROIT, MICH.

"There were visitors there from London, Paris, Hamburg, Mexico and South America. Sales have exceeded expectations and everybody is perfectly satisfied with this wonderful exhibit.

"Ignorance is being dissipated rapidly and the mass of people, thanks to the technical journals, have acquired a wonderful knowledge of mechanics as applied to the automobile. The women especially are be-

coming more educated every day. There can be no question but that the gasoline carriage took the lead at this Show. Some of the more complicated machines, however, will have to be simplified, as simplicity is one thing the public is clamoring for. Prices will stay about where they are for a while. Wood wheels and clincher tires seem to be the popular combination at present."

W. W. BENNETT, TOLEDO, OHIO.

"A grand success in every shape and manner. There are so many improvements to be noticed that it is almost impossible to say which is the most important. The popularity of the vertical engine in front is undoubtedly due more than anything else to its accessibility. This is the one thing about this construction which appeals strongly to the public. High backed tonneaus are taking well, and there seems to be a preference for aluminum bodies. A better class of people were there than seen at any of the preceding shows.

"The excessively large number of exhibits was so confusing that many prospective purchasers left without placing their orders, and these deferred orders should come in within a week or so."

R. NEWTON, NEWARK, N. J.

"There is only one impression to be taken, which is, that the enormous attendance, the great interest manifested by the public and the large amount of business that has been done must lead to an extremely successful season. The people are becoming very interesting to talk to by reason of increased intelligence concerning the industry and its details. Some of the women visitors displayed a very keen knowledge of and interest in the mechanics of the automobile. It was frequently commented on that the cheap machines seemed to have as handsome bodies as the higher priced rigs. A great deal of prestige was enjoyed by cars that were already known, or whose good performance on the road had been heard of."

W. A. RICHWINE, ARDMORE, PA.

"Success of the Show far beyond expression. The gasoline motor was very much in evidence, and showed great improvement. Sales of gasoline rigs have been far in advance of those of other powers, and it has been no trouble at this Show to explain the features of this type of car to an interested and intelligent public."

T. FRANKLIN CANNON, EAST ORANGE, N. J.

"The only thing I have to say is that the Show has been a big boom to the automobile business. It seemed to me that every visitor went there for a purpose. It was a great success from every point of view.

"The public were more interested and seemed to be very well posted indeed, even to the extent of novices going there and asking technical questions concerning the mechanisms.

"In looking about it appeared to me that we are already approaching a standard of types, and the result is that it is making pretty keen competition. I was under the impression that everyone would possess a few talking points which the others would not have, and I am much surprised to notice there was much sameness throughout."

M. L. BLEVER, OF DERBY, CONN.,

a well known automobile enthusiast and automobile agent, when spoken to by a HORSELESS AGE representative, had no hesitation in expressing his ideas relative to the great exhibition. "The French machines have had the reputation of being 'IT' in the past," he said, "but this year the American manufacturers have made a showing that proves conclusively that within three or four years at the most the cars made in this country will be equal to anything that can be turned out abroad, even if they are not superior, and that is by no means an impossibility.

"The Winton machine is equally as good in finish, appearance and running ability as many of the imported cars that cost twice and three times as much, and there are American machines with upright motors which, in my opinion, are much superior to some of the foreign creations.

"That American cars are thoroughly reliable and durable is now an undisputed fact, and it is pleasing to note how the manufacturers in this country have drifted away from the buggy type of rig that was almost universal with them in the early models.

"In my opinion an automobile should be distinctive and should look like a horseless vehicle and not like a compromise between a buggy and a surrey. A hood in the front, individual front seats and a tonneau back gives a machine an appearance that is at once attractive and desirable.

"In relation to the question of horse power past experience has shown that many American manufacturers have underrated the propulsive energy necessary to carry two or four persons along over American roads and to negotiate heavy hills. A machine that is designed to carry four persons should have at least 10 horse power, and, better still, 12 or 15 horse. It should be able to climb all ordinary hills on the high speed, for, apart from the increase wear on bearings and the heating of the motor, low speed gears are generally noisy and frighten horses.

"It is better to have a machine geared to 20 miles an hour and capable of climbing fair sized grades at a decent rate of speed than to have it make 30 miles an hour on the level and be compelled to change gears on every slight up grade. The less clutch levers there are the better, and the fewer times they are used means longer life for the machine and for the gears. The automobile of today is by no means perfection, but it is far past the experimental stage and is on the high road to practicability and success.

"The exhibition has done much to help the horseless vehicle along and I have noticed that the crowd that visited the Show was not composed of idly curious people, but in the main part of men who want machines and who have the money to buy them."

H. H. MUNDY, OF UTICA, N. Y.,

a gentleman well known in the industry, who spent the whole of last week in Madison Square Garden, was seen at the Pierce stand talking automobile at a two-forty gait to a crowd of interested spectators. It was evident that he was heart and soul in the discussion, and when he had made his point he expressed his views about the Automobile Show in no uncertain language:

"This exhibition is certainly the greatest event of its kind the United States has seen so far," he said, with a sweeping gesture of his hand around the hall. "It excels anything in past years 50 per cent. and is a showing of which the American manufacturers can be justly proud and which deserves the liberal patronage it is eliciting.

"The improvements on all makes of cars are marked, and with the present keen competition and the growing tendency toward stronger parts, heavier bearings, chains, gears and in fact all moving parts, it would not be surprising if the future brings forth a car that can be guaranteed not for two months, but for two years or even longer.

"It is evident on all sides that the tendency of the majority of buyers is toward the gasoline cars, and they are the prime favorites and sellers. Outside of the White carriages the steam machines are not causing any great amount of excitement, although for all of that they are worthy of as much attention as the rest and have been equally well improved and worked out.

"At the present rate American manufacturers are going their product will undoubtedly be on a par with the best the French can turn out before two or three years have passed, and even as things are now we can give them a good run for their money.

"There is a great demand at present for a medium priced 10 to 15 horse power gasoline touring car capable of traveling on American roads and giving satisfaction under ordinary touring conditions. This demand is to a certain extent being met, but in my opinion there is a big field for a car, with a high speed motor of this type, that can be sold for less than $2,000, and that will really do the work. There have been too many manufacturers who have loaded down 5 and 7 horse power motors with loads far too great for them, with the result that their machines have been continually undergoing repairs, and the wagon that I refer to must not necessarily be a high speed rig, but it must have sufficient power to carry the load that it is intended will be piled on it.

"I have attended all the shows, but this one surpassed any of them. Gasoline was the lead in popularity. Those who have used the small runabouts are now taking up the medium weight tonneaus. I find that the medium priced tonneaus are very popular, especially among those who live in the smaller towns and villages. There seems to be only one steamer which is attracting much attention to the steam line, which shows that steam has lost considerable in popularity since last year."

OTHER INTERVIEWS.

In fifty other interviews disclosing a practical unanimity concerning the magnitude and success of the Show, the triumph of gasoline, the rapid education of the public, the raising of constructional standards and the great advance made in body building, the following conclusions were very prominent:

In steam construction a very short time will elapse—perhaps not over a year—before no more models will be turned out minus a condenser outfit.

The policy of several steam manufacturers in breaking away from the common stanhope type and making other disposition of their machinery calls attention to the depth of the rut in which steam has been allowed to rest, and will act as a stimulus to further exhaustive research on lines of originality and improved construction toward a fuller realization of the possibilities of steam.

Constructional perfection in the electric has about been reached, and beyond supplying customers, to whom its limitations are not objectionable, no great bound in popularity will be made until the master minds at present struggling with the problem present the result of their labors in the shape of a perfect accumulator.

While the gasoline electric combination system may prove attractive to some and may, in fact, be able to deliver a larger percentage of power at the wheels than the gasoline car with transmission gearing, the gasoline motor has been brought to such a state of reliability that it only needs the production of a silent, flexible and efficient transmission gearing to rob the combination vehicle of its only excuse for existence.

The pressed steel frame bars are here to stay, although hot rolled sectional material, which has proved satisfactory in the past, will not be discarded.

The vertical motor in front construction, with either countershaft and chain drive or bevel gear drive to live axles, is to remain with us for a long time as one type, but there will always be room for any efficient car, no matter where the motor may be placed.

Many mechanical bees are already buzzing on the question of getting the power to the wheels without turning a corner, and we may hope to see this feature among the leading innovations of the near future.

A few years more will witness a high degree of standardization; also perfect insulation of the high tension spark.

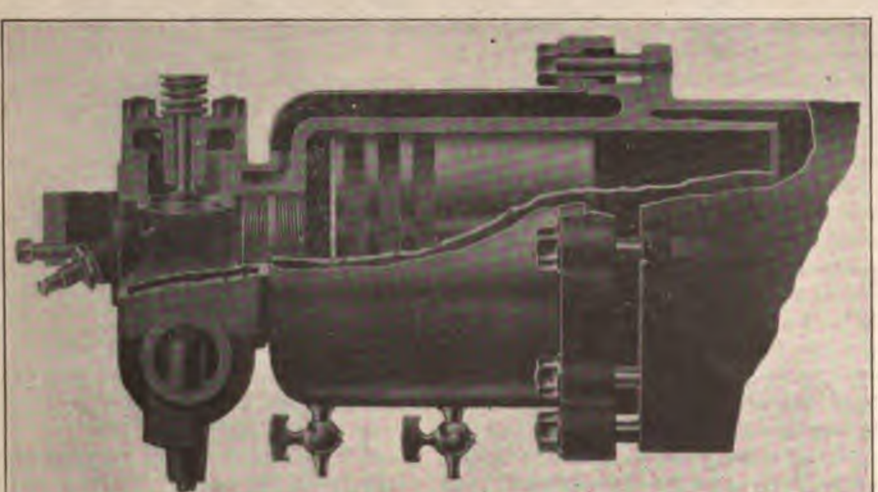
Next year will witness a large increase in the use of honeycombed radiators and mechanically actuated inlet valves. The former will undoubtedly find a permanent welcome, but after the copying craze is over a reaction will probably set in in favor of automatic inlet valves. Much ingenuity will be brought to bear upon incorporating into the automatic valve the advantages accruing from mechanical operation, thus permitting its valuable features to be retained.

There were many physicians among the visitors and many inquiries were received for physicians' cars.

Better coils, better plugs, better insulation, better magnetos, etc., furnished by the parts makers will be a great benefit to the jump spark system.

Wire wheels and single acting brakes are rapidly disappearing.

The establishment of an automobile stage route between Patchogue, Sayville, Islip, Bay Shore and Babylon, L. I., is being discussed. It is proposed to have built five or six electrical vehicles of high power, each capable of carrying twenty passengers.



CYLINDER OF CADILLAC ENGINE.

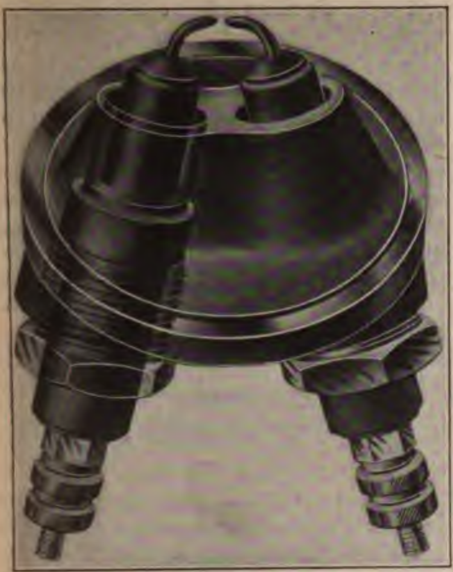
NEW VEHICLES AND PARTS.

The Cadillac Gasoline Automobile.

A brief general description of this machine appeared in a recent issue of THE HORSELESS AGE, and we are now able to give some further particulars about details, with the aid of a number of illustrations.

The engine of the Cadillac is a single cylinder, horizontal one and comprises many features of originality. The cylinder bore is 5 inches and the stroke the same, and at 1,100 revolutions per minute the engine is claimed to develop 7.3 brake horse power. The water jacket is of sheet copper without corrugations, yet attached to the cylinder casting in such a manner that there is absolutely no danger of springing a leak, the joints at both ends being clamped or pressure joints. The exhaust and admission valves are arranged one above the other in a valve chamber on the head of the cylinder, and are both mechanically operated. This valve chamber is water jacketed, although it forms a separate piece from the cylinder casting. It is fastened to the cylinder by means of a large size nipple with right and left hand thread which forms the communicating passage between the valve chamber and the cylinder. This is well shown in the illustration herewith. A dowel pin prevents the valve chamber from turning when the right and left hand nipple is screwed to place. The sheet copper jacket is cut with openings through which the water jacket of the cylinder and the jacket surrounding the valve chamber communicate. An advantage of the copper jacket is said to be that the cylinder will not be cracked if the jacket water is allowed to freeze.

The spark plug is of an original design, having both terminals insulated and being held in place by a yoke clamp screw, which admits of its being removed for cleaning or replacement with the greatest facility. The complete plug consists of a metal base into which are screwed two separate spark plugs, at an angle, with the platinum or nickel spark terminals brought within a short distance of each other. It is, of course, readily understood that with both terminals insulated the plug will continue working an indefinite period if one terminal should become grounded, and there will generally be less leakage of current when both terminals are insulated. The company also furnishes a metal base threaded to receive any ordinary spark plug, so that any user who should wish to use another kind of plug can do so with the least inconvenience. It will be noticed that the spark plug is held in place by a clamp screw and can be removed after slightly loosening the screw. The spark coil is attached to the side panel of the body close to the cylinder head, and the secondary connections of the wiring are extremely short, giving the greatest possible guarantee against leakage.



SPARKING DEVICE.

The carburetor is of a simple spraying type without float, and the engine speed is controlled by varying the lift of the mechanically operated inlet valve. The inlet valve is operated by means of an eccentric on a secondary, half speed shaft. Referring to the cut, a cam rod A is actuated by this eccentric. B represents the stem of the intake valve and C a double armed lever pivoted on lugs extending upward from the crank chamber casting. One end of the lug, as seen, is forked and provided with a roller E, with which engages the cam rod A. The cam rod A also moves on the grooved roller E, which is supported on a pin at the end of the arm F pivoted to the top of the valve chamber casting, on a stud G. On the same pin as the roller E, and outside of the latter, is mounted the bell crank H, which has a cam surface I engaging with the pin J extending from the valve chamber casting. The cam surface I is always held against the pin J by means of a coiled spring S which presses against the lever arm F. The operating rod L, which connects to a lever directly below the steering wheel, permits, by means of the cam surface I and the pin J, slightly rotating the arm F around its pivot G, thus bringing the grooved roller E farther forward and causing the cam rod A to rise a greater distance. If the operating rod L is moved in the opposite direction the grooved roller E is displaced toward the rear, farther away from the cam surface of the cam rod A, and the inlet valve is then only lifted very slightly. The lift of the inlet valve can thus be varied from the maximum to almost zero. The illustration of the mechanism herewith shown is only a sketch and does not give the correct proportions of the parts.

The engine bearings have substantial bronze bushings in two parts and the bearings are made with caps arranged as illustrated herewith, which allows of ready removal of the bushings by only removing three screws.

CRANK BEARING.

The transmission gear is of the sun and planet type and gives two forward speeds and one reverse. It is in the form of a simple cylindrical drum arranged on an extension of the engine shaft, the driving chain sprocket being located on the inner side of this drum and the face cam for operating the high speed clutch on the outer side. The transmission case is filled with heavy oil through an oil hole on the sprocket side at appropriate intervals and the entire transmission mechanism runs continuously in oil. From the change gear the power is transmitted to the live rear axle by a five-eighths inch roller chain of 1 inch pitch and one-half inch width of rollers. Different rear sprockets may be fitted to suit the topography of the country in which the carriage is to be used. For hilly country it is of course advisable to use a lower gear. The four gear ratios referred to are as follows: 9:31, 9:34, 9:38, 9:41.

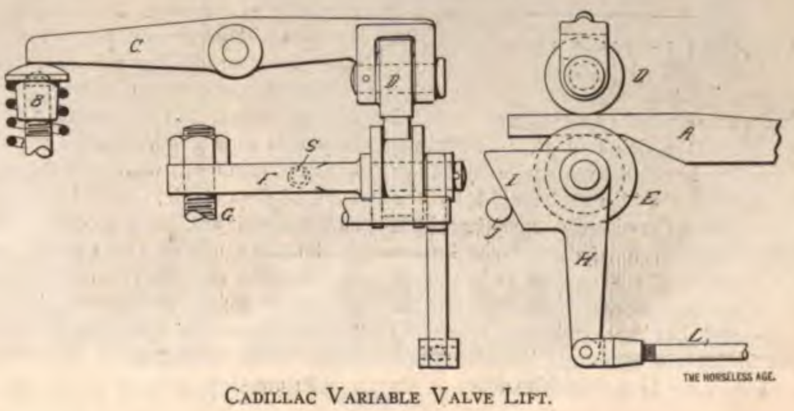
The cooling water is circulated through a cooling coil of flanged tube located in front of the carriage and a water tank of cylindrical form above the cooling coil by means of a centrifugal pump driven from the engine direct without the intermediary of gearing. The pump is fastened to the body frame at the side, directly in line with the engine crank shaft, and is driven from the crank shaft through a grip clutch which avoids all possibility of the pump shaft binding in its bearing owing to the pump and engine bearings getting out of line with each other.

METHOD OF REPLACING CRANK BEARINGS.

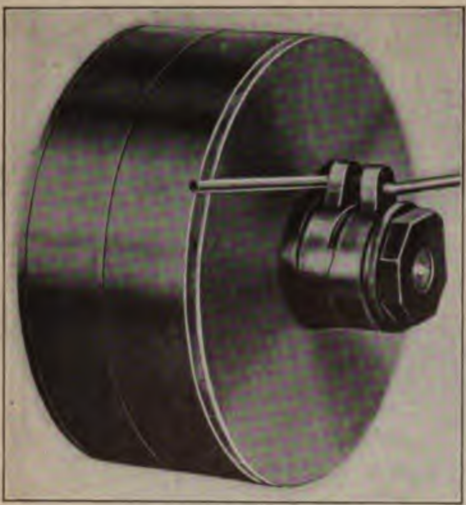
Much care has been bestowed in the design upon reducing the number of oiling places to a minimum, and it is claimed that there are not over ten places to be oiled. Nevertheless, all the wearing parts are supplied with means for lubrication, and one or two of the small rock shafts employed have small compression grease cups screwed into them from the end for continuous lubrication. The caps of these grease cups are weighted to prevent their being jarred loose by the vibration on the road.

The muffler is placed on the rear part of the body and is of very large dimensions in relation to the cylinder of the engine. It is also fitted with a cut out for use on unfrequented roads, which is operated by a foot button in the floor or the carriage. The engine is chain connected for starting to a transverse shaft below the footboard of the carriage, and the starting may be effected by means of a detachable crank from either side of the vehicle with equal facility.

The primary ignition circuit is carried to the kneeboard of the carriage directly under the operator's seat and has there a plug switch inserted in it. Close to the switch is another "dead" socket for the switch plug, and by removing the plug from the live and inserting it in the dead socket any danger of untimely starting of the motor by unauthorized persons is obviated. The vehicle is steered by an inclined hand wheel of liberal dimensions and the steering effort is transmitted



CADILLAC VARIABLE VALVE LIFT.



TRANSMISSION.

through a rack and gear. The rack is completely enclosed and can therefore be kept properly lubricated and free from dust and grit.

The gasoline tank is located under the seat and has a capacity of 7 gallons, which is said to be sufficient for a run of 175 miles on average roads. It has a large hand hole on top for cleaning, provided with a small filling opening and strainer and a sediment retainer at the bottom. A very large cylinder oiler is also provided, which is claimed to supply the engine with lubricant for a distance of 100 miles.

The vehicle has an angle iron frame and semi-elliptic springs. The rear axle and frame are maintained in proper relative position by means of adjustable distance rods on either side of the frame. The vehicle has 30 inch wood artillery wheels and 3 inch pneumatic tires. All axle bearings are ball bearings. On the rear axle is a large double acting brake, acting on drums 8 inches in diameter and 1⅝ inches wide fastened directly to the two halves of the rear live axle. This brake is operated by a pedal. The high speed and reverse are operated by a single hand lever, and the slow speed by a pedal. The throttle is operated by a small lever below the steering wheel and the ignition timer by another lever rising from the floor. The total weight of the machine is 1,100 pounds with a runabout body, and slightly more, of course, with the detachable tonneau in place.

"A Friend in Need Is a Friend Indeed."

A recent dispatch from Racine, Wis., states: "All the debts of E. J. Pennington have been settled by his wife, and their personal effects will not be sold by the Sheriff. Mrs. Pennington says her husband has not deserted her, and she knows where he is. She says her father died, leaving her an income of $500 a month, and she and her husband will return to Racine in March. Warrants issued against Pennington have been withdrawn."

A Motor Propelled Line Wagon.

U. S. Consul Haynes, at Rouen, France, sends the Government a report on a motor tower wagon for repairing line wire which the Compagnie de l'Est Parisien has recently had constructed. The vehicle is capable of carrying six workmen and 500 kilograms (1,102.3 pounds) of material, for the purpose of repairing aerial wires. The platform of this vehicle when raised can support two workmen at the height of 6 metres (19.685 feet) and allows them to work without interfering with the passage of street cars, the platform being changeable either to the right or left side. With this machine, 10 to 12 kilometres (6.21 to 7.456 miles) of wire can be attended to in one hour. The motor of this vehicle is horizontal, with

FRENCH MOTOR TOWER WAGON.

two cylinders. It is of 12 horse power and is placed in front.

The illustration shows the apparatus open; when closed, the height is that of the lowest section. The railings of the platform fold down.

The 1903 Merkel Motor Cycle.

In the new model of the Merkel Manufacturing Company, Milwaukee, Wis., a number of changes and improvements over last year's model have been made. Formerly the motor had a bore and stroke of 2⅝ inches; but in the new motor the stroke is now 2⅞ inches. The inlet valve can be removed without taking off the head of the cylinder. The lower frame bar and seat mast are in one piece and the motor is 8 inches nearer the ground than formerly. No separate muffler is employed, the spent gases passing into the lower bar of the frame and escaping through small holes in the seat mast.

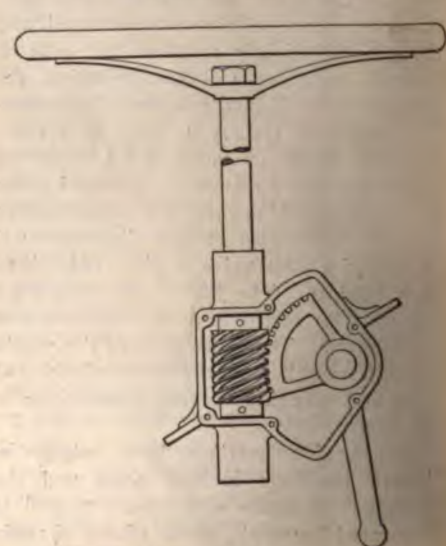
A triple stem fork, two stem handle bars and an adaptation of the Regas spring frame are employed. The tank and oil capacity have been increased, so that the wheel is now capable of covering 110 miles on one supply. The coil is located under the gasoline tank and only short wires are, therefore, required. An oil deflector has been added and single lever control has been retained. The drive is by a flat belt 1 inch wide instead of by a round belt, and a spring idler is used. Lubricating oil is now fed to the crank chamber by a sight feed device.

Schoeller Tool Steel.

Various brands of steel produced by the Ternitzer Steel and Iron Works, of Ternitz, Austria, are being imported and placed on the American market by the International Steel and Machinery Company, of 245 Centre street, New York. Three classes of steels are offered by this house, suitable for various purposes, as follows: Two self hardening tool steels, "Express" and "Universal," for which great durability of cutting edges is claimed; special chromium and "Wolfram" steel, for cutting extra hard metals, and the usual carbon steels, in six different degrees of hardness and containing a certain percentage of manganese. It is stated that these steels are suitable not only for cutting tools but also for cams, rollers and other wearing parts of automobile motors which require to be of hardened steel. The company issues a booklet which sets forth the particular qualities of each brand of steel, and to what purposes it is particularly applicable. We learn that one prominent automobile manufacturer is making extensive use of these steels.

Dyke's New Steering Device.

A. L. Dyke, St. Louis, Mo., has placed upon the market a steering device of the irreversible type, controlled by a hand wheel of large diameter, and transmitting



DYKE'S WHEEL STEERING DEVICE.

the steering effort to the wheels through a worm and worm wheel sector. The joint with the rod running to the steering knuckle is made adjustable.

New Bliss-Chester Radiator.

We illustrate herewith an eight tube coil of flanged radiator tubing, recently brought out by the Bliss-Chester Company, of Providence, R. I. The coil can be used singly or can be made up into larger radiators for high powered machines.

The Newcomb Steam Carriage.

A steam car embodying a number of novel features is at present being exhibited in New York city by E. C. Newcomb, of Boston, the inventor and designer of the car. A feature of the design is that, according to the claims made for the car, absolutely no hand regulation is required aside from manipulating the throttle. The boiler is of the coiled type and without water gauge, so the necessity of watching this device is avoided.

It is claimed that the steam is delivered to the engine at a practically uniform temperature and pressure, irrespective of variations in the load. The pressure and temperature may be adjusted at will, but when the adjustment has once been made neither factor will vary more than 20 per cent. The generator consists of a coil of three-quarter inch steel tubing. The underlying principle of the system of control is that of uniform boiler efficiency for all variations of load, which permits very satisfactory regulation with a proportionate feed of fuel and water. The boiler efficiency is stated to be about 78 per cent.; the temperature of the steam delivered, 650° to 750° Fahr., and the temperature of the flue gases about 250° Fahr. The quantity of water in the generator is said to never vary more than 3 per cent. The fuel is fed to the burner by means of a pump driven from the engine, and while the carriage is standing by air pressure in the fuel tank of only 7 pounds to the square inch.

The engine is a simple, single acting, three cylinder vertical one with splash lubrication. The transmission to the rear axle is effected through a shaft with universal joints of novel design and bevel gears.

The weight of the vehicle is 1,100 pounds and the engine is rated at 6 horse power. The radius of action on one supply of water is stated to be 40 miles, the average distance per gallon being 2.7 miles, and the average distance per gallon of fuel 20 miles. The design of the carriage appears to be exceptionally simple and the amount of piping found in most steam carriages is greatly reduced. A number of patents have been allowed on the system. Mr. Newcomb's New York address is care of Kenyon & Kenyon, 49 Wall street.

King Edward has ordered a new motor car—a 22 horse power Daimler—and has given permission for it to be exhibited at the Crystal Palace Show at the end of this month. The car, which will be used for shooting purposes, will be of the four cylinder type, with a wheel base of 10 feet. The body and wheels are to be of dark and light oak, with "natural wood" finish. A canopy top will be provided for light luggage.

The Defiance Patent Tenoning and Cut Off Machine.

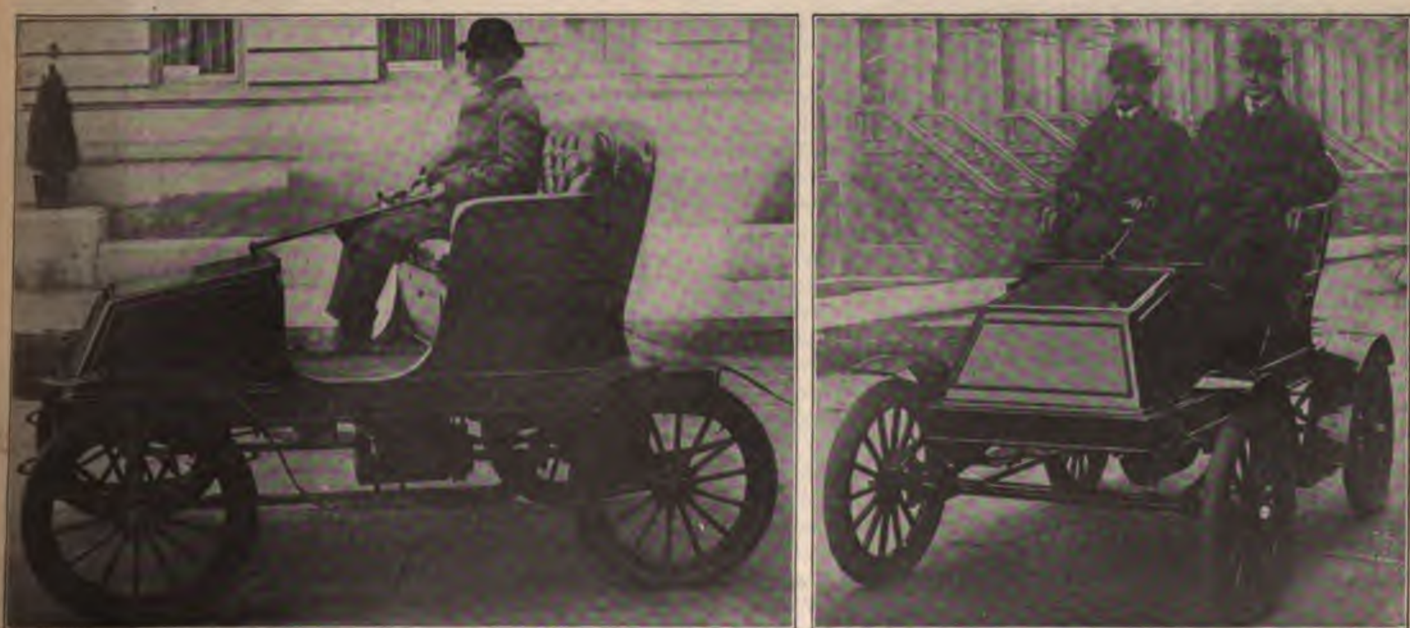
The machine shown by the accompanying engraving is used for cutting off the tread end of spokes to equal lengths, after they

are driven into the hub, forming diameter of wheel, and cutting tenons thereon, of various sizes and lengths, and finishing the end of spokes complete, ready to receive the felloe.

It is adapted to cutting tenons on either light or heavy wheels, from one-quarter to 1½ inches diameter, various lengths up to 6 inches.

In operation the wheel is revolved over the saw, reduced to proper diameter. The spoke to be tenoned is held at tread end between two V shaped clamps, which open and close simultaneously by foot lever, bringing the centre of any sized spoke to the centre of the knives. The cutter head is moved to and from the spoke by hand lever, and is supplied with adjustable collars to govern the length of tenon, the operator having both hands free to handle the cutter head and revolve the wheel.

This machine is manufactured by the Defiance Machine Works, of Defiance, Ohio.



Two Views of the Newcomb Steam Carriage.

LESSONS OF THE ROAD

Two Years' Experience of the President of the Berkshire Automobile Club.

By Dr. Frank W. Brandow.

Early in the spring of 1901 I made up my mind I must have an automobile, I had heard so much about them, and after talking the matter over with a friend who had one I went down to New York to buy. I went to all the dealers I could find, looked over the machines and rode in most of them. I found the agents very accommodating. I gave my order and in due time, as promised, the freight agent called me up on the telephone to say that he had a queer looking machine on wheels for me and he hoped I would come down and superintend unloading it. I got a team of horses and soon had my automobile in my stable. I afterward discovered that it was all filled and ready to run home on its own power, but I was a novice at this business and did not even know just how to start the thing until I got it home and got out my little book of instructions and read it over and over. Then I tried to start up. At first I could not make a go of it, because I did not know more than to turn the crank. I did not know where the dead centre was to start from, but I got it in time. My man soon got onto the centre and then that trouble was passed. After we got her running nicely I took the wheel and instructed my man to get in with me. Thomas looked rather unhappy at this, but as he always obeys orders, he got in. I worked the low gear carefully at first, and after a little practice I soon found out just what it would do, and away we went out on the street. I must confess that it took quite a little courage to pull in the high speed lever, but after I got out on a good wide street I let her go, and I soon discovered that I had nothing to fear, as my throttle held my engine under perfect control. Away we went. I was master of the critter, or at least I thought I was. I used my carriage every day after this, going to Lenox, 6 miles out; Dalton, 5 miles, and other places near home. I soon found I could do all this work in less than half the time I had ever done it with a pair of good horses. Everything went along beautifully at first for a month or six weeks. Then troubles came on with a rush.

TIRE TROUBLES.

First I tore a big hole in a tire, then I put up $35 for an extra one. This I should have done when I bought the machine. Every buyer ought to get one extra tire when he gets his machine. My first trouble was on a hurry call at Dalton. I started out to see how quickly I could do it. I arrived at my destination in record breaking time and was delighted at what I had done. Just as I was coming out of the house of my patient I received a call from my office by telephone urging me to return as soon as possible, as there was a gentleman looking for me who wanted to catch a train. I started off as fast as I could, thinking I would surprise the gentleman. Well, he never caught that train, for I failed to connect. About half way home I had to cross a railroad bridge. I was just sailing when I struck this bridge. I forgot that a steep hill confronted me on the other side, and almost a right angle turn at the foot of the hill. Hills had no terrors for me; I was new at it, ignorant; I know more now. I sailed along over the bridge, and just as I rounded over the top I put on my brake and—"great Scott!"—I had none. My man had oiled the differential gear so slovenly that oil had run between the brake shoes. Perhaps you can imagine my feeling. I pulled my steering wheel, and as I was terribly wrought up I overdid it and the machine raised up just a little, my man crawled up to me a little, and I found I was going over, so I pulled back on the wheel. Overdid it again, and this time away we went, down the bank and plunk into a fence made of ties by the railroad people, a good, strong one, fortunately. The fence stopped us. My man landed on the other side of the fence, face down. I shall never forget how he looked as he turned over and crawled up on his feet. "Are you hurt, doctor?" were the first words spoken. I assured him I was not hurt in the least, only badly shaken up and scared more than half to death, but still on deck and ready for business, if there was anything doing. My engine was running smoothly, but what a looking machine! My lamps, those nice brass ones, were all smashed; the main power axle badly broken, and the forward axle bent almost in a half circle. As my engine was running I made up my mind that I had something left worth taking home. I told my man he had better hunt up a farmer to cart us home, but Thomas seemed to think we could help ourselves; so we went at it. With the power to help us we managed to back off, and after a hard struggle we got back on the road again. Fortunately the bank where we went off was not very steep. I put in my low gear and we crawled back to my stable. It was slow work, and very funny we looked, all broken up. While running in and out everyone we met laughed as though it was a real good joke. I did not quite see it in that light, but I went in under my own power. I can say this and yet tell the truth.

About a month later my exhaust spring broke just before my office door. I knew we had a break that I could not repair on the road. Fortunately my man was driving by just as this happened. I called him, and getting out a nice little tow rope that I always carry in the toolbox of my machine for my friends, I hooked on to a little light road wagon, and my little mare pulled the machine back to my stable. This is the only time, but I went on "my own power."

After the accident I was out of it for a few days, but my machine fell into the hands of first class mechanics, consequently I was soon out with a nice set of brass lamps, and all in first class running order again, ready for business. The newspapers all got on to the accident and they did it up brown. One stated that I was badly broken up (I was, but not that way), another that the machine was a total wreck and my man was fatally injured; still another had him alive but a cripple for life. We had the laugh on the reporters, especially a week later when we came out with the machine all in perfect condition. After I got out again, one day while along on the road I came to a hole. I saw I could not stop quite quick enough to avoid it, so I used my emergency brake, and stopped nicely. Then it dawned upon me that I could have done this when I had the accident and saved all that trouble and expense. What a fool I had been. I promised myself not to forget it next time, and I have kept my word.

A friend from Hartford, Conn., came up to visit me soon after I got my machine out again. He was a prospective buyer and he wanted to know all about the business. I took him out and we headed for Lanesboro, a small town about 4 miles above Pittsfield. I remember it was a beautiful day, and my machine was running along smoothly at a good clip (within the law, of course). About half way up we came to a little hill. I pulled up and put on my low gear, as we always do on hills. Just as we rounded over the top, running about 4 miles an hour (not over this), we saw in the distance ahead a top carriage approaching, containing two women and a child—a single horse, a nice looking brute, a young woman, her eight year old son and her mother. The young woman was driving. The moment the horse saw the machine, he stopped and began to back a little. The woman yelled and dropped the reins. I put on both brakes and my friend threw off the switch, so my engine came to a dead stop instantly. The horse continued to back and turn, so my friend and I left the machine and ran towards the horse's head. But before we could get there the brute turned and over went the carriage. Fortunately the carriage was a cheap one. The top and seat cracked off, leaving the people on the ground in a heap. The boy jumped up all right, then the young woman got up, but the old lady thought she was killed. We helped her up, and I discovered that she had run her arm between the top braces and the result was a break just above the wrist. The young woman abused me constantly: "You will pay for this, see if you don't! You will pay for this, see if you dont!" This she repeated over and over again.

The old lady was not so aggressive. I offered to do all I could for them, offered to take the old lady to the hospital.

"Oh," she yelled, "the hospital! Do you want me to die? Oh, dear, I would not go to such an awful place. People always die when they go to a hospital." Oh, no, she would never, never go to that awful place. Later she changed her mind completely, and I believe it was hard work for the doctor to get rid of her when she was well able to go home. She wanted her own doctor, so I went after him as fast as my machine would go. After a time I got the doctor, and together we returned and I assisted the doctor. We set the broken arm all in good shape, and I then offered to take the woman home, but not a bit of it. Oh, no, not in that awful thing. So I ordered a carriage, and the woman was taken home.

I afterwards found out that the horse was a record breaker for nervousness, a kicker, balker and, in fact, a very dangerous brute for anyone to drive. Of course these people thought the proper thing was to jump onto me for all there was in it. They did. I measured the distance between where the horse turned and where the machine stood and found it to be just 99 feet, and yet it was my fault. I paid all of the doctor's bills, for a carriage to take the woman home and in fact I did all I could for her comfort while she was at the hospital. Then I offered her a very reasonable settlement, but oh, no, they wanted big money. About three months after the accident the young man came to me with his wife, the young woman, and she complained that her ribs were cracked and in bad shape. This they informed me was a damage, and they wanted me to settle for it. I assured the woman that I would have her taken to the hospital and have a specialist from Boston make a very careful examination of her, and if her ribs were broken we would settle. What a cure this was. The woman would not stand such treatment; was her word not good? Not much, madame. We must have proof. She recovered in a second. That ended it.

Fortunately, I was insured. I got a policy the first thing I did after I bought the machine. This cost me $25. Insure to the limit of $5,000 one person, $10,000 more than one. I advise every owner to carry a policy. You have something to fall back on in case of an accident. I simply notified my company, and they took tne whole thing off my hands. The people brought suit against me for $5,000. Of course they had no case, but I was sorry for the old lady, and I urged them to settle with her, and they did give her $250. That ended the trouble. I call the insurance a mighty good investment. I always carry a policy now. They cost more now, but it pays in the comfort I get out of it. The newspapers gave me credit for all I had done in this case.

Soon after the accident a friend, a physician, asked me to take him to ride. We went to Laneboro. On the way up a big bulldog came out, barking and growling. I could not drive him off. He followed up half a mile, and I often wished he would get around in front where I could finish him, but after a time he seemed to get tired, and he stopped and went back home. Just beyond we saw a fine lot of hens feeding in the road. I blew my horn, but it had little effect. One big rooster kept on eating, and he lingered too long. I struck him just on the starboard quarter. My friend was disgusted with me and he said: "There, the d——, I knew you would do that." I looked back and then assured him the rooster was all right, and that I had seen him walk off with the hens. He asked me what the machine weighed. I told him a little over a ton. Then he called me a liar. We turned for home after a little and returned by the same road.

Just as we were passing the house where the dog came out I heard a low growl, and, sure enough, here was our friend. He began to worry me as before, and I must confess I was mad I did not slow down when he got in front, as I did before. I believe I opened her up just a little at times, and one of these times we caught him. Bumpety bump! bow wow! and it was all over. My friend said: "Well, I hope you feel better now." I assured him I certainly did. He gave me a good lecture and said he really believed I had done it purposely. I enjoyed it. He asked me if I thought the dog could walk as well as the rooster did. I told him I would go back and settle for the dog if he thought best. He said: "No, no; go on. I know those people, and it is bad enough now; perhaps they did not see us."

They did, though, and about a week after the owner of the dog came to me to get a settlement. I suppose he thought I was dead easy prey for all of Laneboro but he made a mistake. I do not carry insurances on dogs, so I did not propose to be done this time. I looked at the man for a second when he made known his business. Then I said: "Do you acknowledge that you are the owner of that dog?" Of course, he assured me that he was. Then I took his name; he wanted to know what all this meant. I told him I proposed to bring a heavy suit for damages to my machine on account of that dog. He stared at me in surprise, and when he realized that I might turn the tables on him he broke out with a laugh and said he was only fooling; the darned dog was no good and that he did not really belong to him anyway; that a man gave the dog to him and he had not really taken him yet; so he could not be called the owner of the dog. Oh, how things do change at times! Well, if this is the case we will drop it, and we did.

Nothing further came of the dog racket. The rooster I expect to settle for at any time. I shall give the man the price without a single kick if he finds me. Fall came on and I put up my machine. Jacked it up merely and had my man clean it up all in good shape, for I want to sell and buy another. I had gained experience with this one, and now I proposed to get a new one and take good care of it. I concluded that nearly every trouble I had had was caused either by carelessness or ignorance. I am sure of it now.

I made up my mind to sell the old one at any price I could get, so I advertised it in several automobile journals and the New York Sunday papers. I received nearly 100 answers. Most of them came from the New York *Herald* and THE HORSELESS AGE, from Salt Lake City to Halifax, N. S. What a chance I had to trade for stock. Such good stock, too. Some of them assured me if I kept this stock a short time it would be worth good, big money and would certainly prove to be a great investment for me. Any quantity of mining stock. Some of it was sure to go way up. I have had my little experience in mining stock, so I decided not to try mining this time; mortgages on some splendid places in growing towns, and all kinds of trades. One man wanted to sell out his entire interest in an air ship, one that would fly. Of course I would have to put in some money in this, besides the value of the machine, but I concluded to stay on terra firma for a short time yet. The cash was what I wanted, and after a time I got it. I sold it to a man in Hartford, Conn.

The day before the new owner came I started the engine with the old gasoline that had been standing in the tank all winter. Of she went beautifully. I thought it would be better to have my man clean the engine all up nicely and put in fresh gasoline and oil. This was done, and when the man came I went to my stable with him, telling him what a nice machine I had, and one of his first questions was: "Does she start easy?" I assured him I had never had the least trouble of this kind. I stood back and ordered my man to start her up. The man put on the crank and turned her over. Once, twice, and no start. I looked at my man, asked him if he had filled the tank with gasoline. This he assured me he had done. I looked the engine all over and examined the spark. This was working perfectly, but no start. I tried it myself several times, but she would not go.

Oh, how I wanted to kick that whole machine out of the place! But I knew that would not help matters, so I looked it all over again and could see nothing wrong. I began to think the sale was no go, when I thought of the carburetor. I looked into it and not a drop of gasoline could I find. I then looked at the supply valve and found it shut tight. I asked my man why he did not open it, and he said: "Well, I supposed you attended to that." I opened the valve and put on the crank with a feeling of relief. I turned the crank and away she went. All this nonsense from a man who had owned a machine four or five months! I was disgusted with myself. Fortunately my customer was a man of good sense and after I explained the situation he had con-

fidence enough to give me his check, and my machine was sold.

Now for a new one. I began all over again, now that I thought I knew what an automobile ought to be. A friend said: "I'll bet you can't get up courage enough to buy anything but a ———." I simply replied that I should buy the best thing on the market within my means. I went down to New York and went all through the same old business, and after I had looked them all over I went and gave my order for a 1902 model of the make I had used the year before, and I made no mistake. The machine came to me in due time, just as it was promised.

I have run this machine a little over 4,000 miles and it has not cost me one dollar (excepting a new chain) up to date. It stands in my stable now in as good a condition as it was in the day it arrived here. This is a record that I do not believe can be beaten very much. I attribute this to the fact that I knew the make as I had my experience with the first one. I know how to take care of it and how to run it. I have taken some very hard trips with it and given it at times mighty hard work. Out in the Catskill Mountains the chain stretched, as I found some hills out there that I was almost afraid to tackle, but I "did" them, and my machine never failed me once. At times it was about all she could do to get there, but she did it, and never a stop or back down. I could not have done this with the old machine, and should have known better than to have ever tried it, but I had perfect confidence in the 1902 model, and it has never been shaken.

We have in this city, Pittsfield, quite a number of machines and this last spring I called the owners together and we formed the Berkshire Auto Club. We have twenty-seven members, comprising some of our best business men. We have a first class station, capable of holding at least forty machines, well appointed. We hope next spring to build in addition to this station a fine clubroom, where we can entertain our friends when they come touring through the Berkshire Hills.

Mr. Pettifield, of Lenox, went through just before the snow came. He told me of a very funny experience he had had with a scary horse just before coming into town. He met an old couple on the road, and the moment they saw him he felt sure there was trouble ahead, for the woman began to howl like a loon and the old man kept up a running shout of curses, but the horse never paid the least attention. "I expected every moment to see the horse do something, but as he stood still I called out to the man, asking him if his horse was afraid of automobiles. The man said he'd be d——d if he knew, for they never met one before; but he felt sure the horse would run away. The man got out and led the horse by the machine and the horse never winked at it."

Talking of horses, Mr. Bishop, of Lenox, adopted a good plan of meeting by appointment twice a week all owners who had restive horses. They met in a suitable place, where they could walk their horses carefully around the machine, and in this way broke them perfectly. We tried it. We placed a notice in the daily papers, stating that two of our number would meet at the park every Saturday morning at 9 o'clock. The first Saturday it was my turn. I went and waited more than an hour, but nothing came of it. The next week I asked G. F. Hall, one of our number, to get another machine and try his luck. Mr. Hall was more successful. They went down at 9 o'clock, and when they arrived they found two or three men waiting for them. One man drove to the opposite side of the park, got someone to hold his horse and walked around to look the auto over a little first. He asked Mr. Hall how we did it and Mr. Hall assured him it was dead easy. "Now you drive up slowly and I will stand still, at first, and when we get the horse a little accustomed to the machine I will start off and you follow." Mr. Hall then asked the man if the horse was very bad. "Bad, yes! Be gosh, she is the durndest mean critter that you ever seen. I've been almost killed by her twice, and now that these artermbeelers has come I expect she will kill someone. I'd sell her, but I can't. Everyone knows her too well. I met one of them arters on the Lenox road last week and she went off a bank with me and the old woman; nearly scart my wife to death. She hasn't got over it yet, and swore she'd never ride with me again till I broke the darn critter, and that is why I'm here. I druv 11 miles this morning to get this dun."

"Well, my man" said Mr. Hall, "of course I can't promise that we can cure your horse, but we will try. Now you drive up slowly and when I raise my hand you stop."

At first the horse did not act badly. Of course, he was lively and showed signs of fear, but was not really vicious, for they worked along slowly, as Mr. Hall put it. But during this first part of the lesson the machine was not in motion. The man drove up as near as possible, and then something happened. Mr. Hall did not think how the pointer on that steam gauge must be climbing while they were standing there. Well, just as they were getting ready to start off the safety valve went off. So did the mare. She did not attempt to run until she had cleared the deck for action. Then she lit out, and the old farmer got up on his feet, looked in the direction she went, and said: "Well, I'll be d——d. Let her go; I hope she'll break her d——d neck before I ever see her again. Say, mister, I thought you said it was dead easy and you could break her?" Mr. Hall excused himself without even answering the man, and the other people who had horses to break did not linger a moment. We had the laugh on our worthy member. He came to me for advice. I told him
give him none.

Well, I have my second car
up in my stable, where it will st
spring; then I shall give it a nice n
of paint if necessary and it will co
all ready for business. I have had
offer for the machine, but it is not
I think I know a good thing when
and I feel sure I have one.

Meeting of the A. C. A. C Committee.

To demonstrate their value in c
cial life the Automobile Club of A
will hold in May a two or three da
of automobiles built for business pu
This was decided at a meeting of th
test Committee and a number of m
turers, which was held at the clu
on January 22.

Some ten makers responded to t
tation of the committee, while innu
communications were received from
ers who could not attend. The id
test of business vehicles was stron
dorsed by the makers. The Contes
mittee consists of John A. Hill, ch
Emerson Brooks and Roland R. C

It is believed by automobile ent
and by almost everyone who has c
considered the possibilities of the a
bile that power driven machines mu
mately supplant the draught horse
strenuous business life of today.
lined at the meeting the test will be
two or three days, open to busine
cles of all types, both foreign and
can, and not a small part of the t
be through the crowded traffic o
York streets. The committee will
a general outline of the plan after
replies have been received from the

Among the makers represented w
Vehicle Equipment Company, A
Steam Wagon Company, Daimler
facturing Company, Trumbull Man
ing Company, Fisher Motor Vehicl
pany. H. Bartol Brazier, Union
Truck Company and Locomobile C
of America.

Favorable replies strongly indors
plan have been received from the
Truck Company, Vehicle Equipmen
pany, Electric Vehicle Company, F
Searchmont Company, Adams
Company, Daimler Manufacturing
pany, Upton Machine Company, T
Manufacturing Company, Fischer
Vehicle Company, H. Bartol
Thornycroft Steam Wagon C
Union Motor Truck Company, L
bile Company of America, Stearns
Carriage Company, Grout Broth
Louis Motor Carriage Company a
cago Motor Vehicle Company.

Students at the University of Del
land, are reported to have founded
mobile club, with the object of po
ing the automobile among the stud

..COMMUNICATIONS..

Redlands Run of the Pasadena Automobile Club.

Editor HORSELESS AGE:

Under a cloudless sky and with the thermometer registering 70° the following members of the Pasadena Automobile Club started at 9 o'clock on the morning of Friday, January 9, 1903, from the corner of Orange Grove avenue and Colorado street, Pasadena, Cal., on a tour to Redlands: C. B. Scoville and chauffeur, Fred E. Wilcox and Charles E. Brown, in the former's 20 horse power Panhard; Ellicott Evans and H. W. Lee, in the former's 16 horse power Peerless; Robert H. Gaylord and Joseph T. Pugh, in the latter's 12 horse power Packard, and John B. Miller and Carlos C. Daughaday, accompanying Tracy C. Drake in his 10 horse power Autocar.

Passing at the ordinance speed of 4 miles an hour through the business section of this busy little city, so famous as the Mecca of Eastern tourists during the winter months, we increased our pace along East Colorado street to Lamanda Park. Here we turned into White Oak avenue, the principal driveway and boulevard, extending along the foot of the Sierra Madre Mountain range for many miles, spurs of roads running up into the mountain canyons at every section line. This boulevard, the same as all the good roads in Southern California, has been oiled, and during every dry spell (such as we have had for the past four weeks, no rain having fallen since December 17) it is watered twice daily, so there is great comfort in using it.

Monrovia, 10 miles, was reached in forty minutes. Passing through the main street of this growing town, whose bobtail horse car service is about to be supplanted by an up to date electric road from Los Angeles, we soon found ourselves speeding along the highway towards Duarte, which is lined on either side for miles with orange, lemon and grape fruit groves, the golden fruit showing signs of ripening, and the occasional packing houses surrounded with boxes ready to be filled. The only bad stretch in this otherwise perfect highway is crossing the San Gabriel Wash, the dry bed of a once wide and tremendous mountain torrent. From here on to Azusa the road is straight and level, so we easily kept up our touring speed of 15 miles an hour and passed the 20 mile post there shortly before half-past ten.

Turning south here and running between tall hedges of box for two or three miles, another turn eastward soon brought us to Covina, and skirting the edge of the reservoir we had a glimpse of the big break in one side which only a short time ago had let out an immense volume of water, fortunately doing no damage to the adjacent orange groves. Passing near the station of San Dimas and on to Lordsburg through a road lined with tall eucalyptus trees, we found ourselves on Gary avenue, the principal highway in the Pomona district, a street equal to any macadamized pavement in the East, and on this perfect avenue we rolled merrily into the city of Pomona and stopped our engines at the Palomares Hotel, having made the run of 31 miles in 2 hours and 5 minutes exactly.

Inquiring the way to the foothill road by the Chino River, we found that is was but a continuation of Gary avenue, so that one can go for upward of 25 miles without turning a corner, and we at once got under way again and said good-by to the large and curious crowd which had immediately collected about our machines and had begun to discuss their qualities and guess what the parts were for. One man asked me what the water cooler was under the hood of my machine, and when I told him he replied, "Oh, I thought it was a new kind of searchlight."

We found the foothill road comparatively level, but bumpy, for during the last prolonged rainy spell the adobe mud of the main traveled part had become so cut up that a new path had been formed along the grass at the side, and over this we had to slow up somewhat and take things a little more easily. At one point we had an amusing experience with a fractious horse. Although he acted quite badly, his driver was able to lead him by the first two machines, but when he came to the Panhard he grew wild. He snorted, plunged, kicked, fell on his knees, stood on his hind legs, laid down and twisted the harness all up and did everything he could to smash the buggy and break loose from the two men holding him. When they finally did quiet him he balked and refused to budge. At this juncture a four horse team with a load of hay came along, and Mr. Scoville, with rare presence of mind, pulled out a big bunch of hay, stuck it under the stubborn animal's nose, and off he trotted like a lamb. We dubbed Mr. Scoville "The Horse Tamer" after that.

At Ashcroft Ranch, in El Rincon canyon, we stopped for lunch, and a merry one it was, as we compared notes of our running and swapped stories over the festive board, which was the box of a farm wagon. The cliffs above us looked dark and craggy, the mountains beyond had a tinge of cerulean blue, the plain stretching away below us was checkerboarded by deep green orange groves, and in the far distance the snow capped peaks of San Bernardino and San Jacinto pierced the sky. An auto picnic amidst such scenery cannot fail to be most enjoyable.

From El Rincon a heavy grade runs up to Corona, and the road, though oiled, was badly cut up and full of chuck holes. So high gear running was out of the question for several miles. Two or three turns beyond Corona brought us on to Magnolia avenue, that magnificent double driveway, bordered and lined on the sides and in the centre with old graceful pepper trees, so that for mile after mile past Arlington and into the city of Riverside we speeded through a leafy arbor, making up on the gentle down grade what we had lost on the Corona hill.

Riverside is one of the show places of Southern California. Its streets are perfect, its homes beautiful, its orange groves hoted the world over. And I know ot nothing so exhilarating, satisfying and inspiring as a spin of 20 miles in an automobile through Magnolia avenue in January, when our relatives and friends at home in the East are snow and ice bound and freezing for want of coal that even grand juries cannot procure.

Stopping for a few minutes before the Glenwood Hotel, and so gathering a crowd which impeded traffic on the corner, we left Riverside by way of Vine street and followed Colton avenue to the city of the same name 8 miles away. Here Mr. Pugh had to catch a train for Pasadena, while Messrs. Evans and Lee waited for B. F. Thurston, who was to pass through Colton from the East, and who had been notified en route to get off the train there and join our party. The rest of us went on to Redlands via Loma Linda, through rather sandy and poor roads, making the 18 miles from Riverside in about an hour and a half. With great blowing of horns we pulled up in front of the Casa Loma Hotel and were warmly greeted by J. H. Bohon, the genial host.

Our run from Pasadena was 83 miles; our time six hours and sixteen minutes. Nothing had gone wrong with any of our machines, not even an adjustment being out of sorts. Notwithstanding our good picnic lunch we were glad when dinner was announced, and we did full justice to the meal.

Saturday dawned crisp and bright. The air of Redlands, which city is considerably higher than Pasadena, is full of ozone, and many people prefer Redlands to any other place in California. This, too, is one of the show places, and no person who has ever driven up Smiley Heights and gazed on the wonderful beauty of the panorama below can ever forget it. Our machines seemed to be invigorated by the tonic in the atmosphere and all they needed was a dusting off, a spurt of oil in the bearings, a few gallons of gasoline, and they were ready for their return run home.

My machine is fitted with a dust protector made of heavy linen attached to two curved rods which fit on the back of the tonneau and slope outward and backward about 2 feet above the body. It is an absolute protection from dust, and we felt the benefit of it especially going across a stretch of desert sand. It might interest some automobilists as worth copying.

We started from Redlands shortly before

nine o'clock Saturday morning, January 10, and wended our way toward Highlands, where oranges flourish most abundantly and where we saw grape fruit trees sagging under the weight of so many luscious globes. Turning westward on the San Bernardino Base Line road, we found it a broad, well oiled avenue clear into the city of "San Berdoo," as the natives say. At the corner store, where we stopped to inquire how far the good road extended—for we knew we must take another one later on—we should have turned into the town and found Fourth street, our objective road, but being misled by the all knowing store proprietor we pushed on straight and almost before we knew it we were in the midst of deep sand. The Packard and Peerless being ahead had gone on and had entered the bed of the Lytle Creek Wash. The Panhard and my Autocar were discreet and backed out. We retraced our steps about half a mile, took a side road over to Fourth street and crossed the wash on a long, smooth bridge, while the other boys got so far into the sandy bed that they had to continue on and all get out and push to keep their cars along and up the hill on the other side. This desert sand vies with the California adobe mud in stickiness. Beware of it. The salvation of the automobilist in dry weather is the oiled roads—in wet weather, the stable. But the latter species of climate does not bother one much out here, for during the eighty days I have been here this winter only four or five have been rainy, and the mud dries up soon in the California sunshine.

About a mile from the bridge the oiled road ended, and for the ensuing 15 miles our course lay straight across a stretch of desert which is being irrigated and on which vineyards have been planted, so that it took all our power to force through the sandy path and over the stones and rocks at any good speed. Our machines all did themselves proud, however, and at Cucamonga, where we loitered for a few minutes to cool off, the fine oiled road commenced again and orange groves once more lined our way.

From here through Uplands, thence to Ontario, and on for 7 miles more to Pomona, we enjoyed a slight down grade and went singing along at splendid speed. At the gate of one ranch was a large young hound, which seemed to think our machines were some sort of animals to be attacked. As each approached he would crouch down, and when the machine was nearly up to him he would jump out at it fiercely, narrowly escaping getting run over. The others, by swerving sharply, avoided hitting him, but that only made him bolder, and when I came along at high speed he signaled me out for a victim, and leaped at the machine in a frenzy. He struck on the fender, was hurled high in the air, and as we disappeared in the distance we heard him howling dismally as he limped towards the house.

From Pomona our route to Pasadena was over the same roads we took the day before, but we made two or three different cutoffs and so varied the scenery. We stopped for luncheon at San Dimas, in the midst of an orange grove, and then, greatly to our dismay, discovered that the basket of bottles had been left behind. Someone had blundered and our seltzer water was not with us. Then everyone remembered what delicious beer we had quaffed at yesterday's midday meal. Mr. Scoville lamented the loss of the Cresta Blanca St. Julian, which he recollected was several years older than he thought it was. And my own mouth grew puckered at the thought of the Puritas ginger ale which I had counted on. One of the boys suggested that we try a naphtha high ball or a gasoline fizz, and said that he had heard that a cylinder oil cocktail was a very smooth article. However, we quenched our thirst at the ranch house in good, hard mountain water and bubbled away towards our destination in as merry a mood as the circumstances would allow, drawing up in front of the Hotel Green at Pasadena with a running time to our credit of four hours and forty minutes for the 69 miles from Redlands.

The tour was an ideal one in every respect, but particularly so as regards our automobiles, for not a single thing went wrong to mar our constant running; not an adjustment got out of order, not a tire was harmed in the slightest. My consumption of naphtha, which I use in preference to gasoline, was 9 gallons, an average of 17 miles to the gallon, and the Panhard, with its four cylinders, used considerably less than double that quantity.

Our club is getting upon a solid and substantial basis rapidly and has now nearly thirty members. We shall have weekly runs to the many places of interest around Pasadena and hope to not only arouse the interest of the authorities to keep the already good roads in proper condition, but to improve and oil other highways and so make Southern California more attractive to the automobilist than any other section of the United States, as indeed it certainly is now at this period of the year.

TRACY C. DRAKE.

The Speed of Horse Vehicles.

PORTLAND, Me., January 20.

Editor HORSELESS AGE:

Having some curiosity as to the rate of speed attained by horse drawn vehicles on the street, and to satisfy myself as to such speed, I paced off the distance between two trolley poles, skipping over one, making the distance 230 feet as near as could be ascertained without actual measurement. I then stationed myself at a window and proceeded to time the vehicles passing on that side of the street.

The timing was done with a split second timer and with as much accuracy as officers can time automobiles, but while timing the ninth vehicle I accidentally pressed my thumb through the crystal of my watch and discontinued the attempt. I give below a tabulation of the speed of the first eight vehicles passing. The street could not be said to be in even fair condition for speeding, and only two of the vehicles seemed to be making any attempt at rapid work.

It will be noticed that No. 4 on the list was proceeding at the slowest pace. It is interesting, however, to note that No. 4 was a funeral procession which was on wheels; the other vehicles were on runners. The tabulation follows:

DISTANCE, 230 FEET.

Teams.	Time (Sec.).	Rate Per Mile.	Miles Per Hour.
No. 1	11½	4.24	13.61
No. 2	16	6.08	9.78
No. 3	16	6.08	9.78
No. 4*	19	7.17	8.23
No. 5	7½	2.52½	20.87
No. 6	12	4.36	13.04
No. 7	15	5.45	10.43
No. 8	8	3.04	19.56

* Funeral on wheels. Other vehicles on runners.

CHARLES P. HATCH.

Two Cycle Engines.

Editor HORSELESS AGE:

I see from your comment upon my article in your last issue that I am called upon to make some explanations. I do not see the necessity for stating any further reasons why the two cycle engine has not been more generally adopted by automobile manufacturers than those based on ignorance. Putting it in another way, the reason for its non-adoption has been that data for four cycle automobiles engines were easy to obtain, but data for two cycle automobile engines were not to be had, because, until recently, no one had been working on two cycle vehicle engines.

As you seem to want me to go more fully into details I would say that the proportion of port areas to the cylinder diameter, stroke and speed, and the location of ports seem to have been the principal stumbling block in the way of the two cycle automobile engine. My experience has shown me that, as stated in my article, there is no reason why a two cycle engine should not run as fast as a four cycle and as advantageously as the other form at the higher speeds.

In your comment on the article you admit what you seem to have heretofore denied in your paper, that the two cycle engine is as flexible as the four cycle, but your tenacity in clinging to the idea that the most advantageous speed of a two cycle engine is between 300 and 400 revolutions per minute is hard for me to understand. The normal speed of the Elmore engines is twice this, and they run, if anything, better at the higher speeds than they do at the lower, although there is very little difference between their performance at all speeds within the limits of their operation.

In response to your question, "whether it is not a fact, that when a launch is built

especially for speed, a four cycle engine is generally used," I would say that I tested the launch Caprice in 1900, which was built by a firm making both two and four cycle engines, and they chose the two cycle for this launch, with the result that this 40 foot launch developed a speed of 12 8-10 miles an hour, which was at that time about the fastest time that had been made by a gasoline launch in the vicinity of Detroit. That there may be no question about this speed I would say that I was personally in charge of these tests for the owner and that they were made with a stop watch and a carefully calibrated log, on still water. I am not informed as to just what launch now holds the record for speed.

In regard to the two cycle developing 60 per cent. more power than the four cycle, some experiments which we have made since writing you before would give me the impression that by careful and systematic development the two cycle engine may be made to give double the power at the same speed as the four cycle engine.

The anomaly of which you speak is due, I believe, to the fact that very little effort has been made in the past to reduce the limit of weight in proportion to power. Still further, there has been very little done, outside of our own concern, in the developing of the two cycle engines for automobiles, and consequently securing a light weight and high speed machine. I must ask you not to jump at conclusions, but to take into consideration the fact that while the four cycle automobile engine has had the development in the hands of hundreds of builders, the two cycle engine has hardly been touched. Probably not more than a half dozen other firms beside ourselves have tried the two cycle engine for automobiles, but those, however, who have had any experience in the construction and manufacture of two cycle engines are quite willing to agree that they are fully equal to a four cycle engine for this purpose.

I do not agree with you that "the relative power for given cylinder dimensions is a factor that has little influence on the ultimate value of a type of engine for automobile work, as long as enough power can be provided to meet all requirements." As you will certainly admit, one of the principal factors in automobile construction is the securing of the smallest weight of vehicle in proportion to power that is consistent with durability and effective operation. The weight of the engine is no small factor in the total weight of the automobile, and, as the securing of more power for a given cylinder dimension gives a lighter engine, this is certainly a desirable feature.

In conclusion I beg to say that, if there are any of your questions that I seem to have left unanswered, I am perfectly willing to answer them, though I think you will agree with me that a protracted controversy on any subject will not do nearly so much good as practical demonstration.

E. W. Roberts.

[We have never denied that the two cycle engine is as flexible as the four cycle. What we have said and still believe is that it will not run at the same high speed. The flexibility of an engine depends, however, on its range of speed, and as the two cycle engine, owing to its more frequent impulses, is able to run at full torque at a lower speed than the four cycle, its flexibility may still be just as great.

We do not believe that the most advantageous speed of a two cylinder engine is necessarily from 300 to 400 revolutions per minute. We mentioned these figures in reference to launch engines, a subject introduced by our correspondent, and this is the normal speed of the average small launch engine.—Ed.]

Carbon Particles in Cylinder.

Editor Horseless Age:

What is the best way of keeping down the deposits of carbon in the sparking chamber and cylinder head? I have had some little trouble with that. At one time some carbon got into the exhaust valve while I was on the road and, of course, the compression was lost. Being a novice, I had to work some little time before I could discover what the trouble was; but after I found it I fixed it in about fifteen minutes.

Joseph H. Weinstein.

[Carbon deposits are generally due to the use of too much lubricating oil or oil of poor quality. The only remedy is to use good oil and feed it to the cylinder as required—that is, neither too freely nor too sparingly. It is a good idea to inject a small amount of kerosene into the cylinder after returning from a trip and turn the engine over by hand a few times (with spark off). The kerosene will dissolve the coating of gummy or resinous matter from the gasoline deposited on the piston and cylinder walls and keep the wearing surfaces in better condition.—Ed.]

Adverse Legislation in New Jersey.

Camden, N. J., January 22, 1903.

Editor Horseless Age:

You are no doubt aware that the Governor of New Jersey has seen fit to refer to the automobile in his message to the Legislature as one of the crying evils of the times and asking that a law be passed for its suppression. Mr. Scovel, a member of our Assembly from Camden, introduced such a measure the other day which must have appealed to the Governor's admiration. I have been asked by some of my friends to send you a copy of the letter which I wrote to Mr. Scovel upon his attitude in this matter, for publication. I therefore inclose a copy, which you are at liberty to publish if thought worthy of a place in your valuable paper. The bill, as I understand it, in its present form would constitute an insufferable outrage on all automobilists.

A person could be held up fifty times between here and Atlantic City by as many constables and compelled to show his license, and, if caught without it, fined $50. Almost all of its provisions are to be condemned in the strongest terms. Please take up the matter and see that as many members from the upper end of the State as possible vote against such a bill. It will ruin the sport and business in New Jersey if allowed to pass in its present form.

C. S. King.

Hon. H. S. Scovel, Member of Assembly from Camden County:

Dear Sir—I regret exceedingly to learn through the Philadelphia *Press* of the 20th inst. that you, of all other members of the Legislature, should have been induced to introduce and support such an outrageous act limiting the use of automobiles in New Jersey. I have always regarded you throughout our intimate acquaintance as a man of the most liberal and progressive ideas, who would lend all possible encouragement to any advancement in the arts or methods of life. Instead, however, you take the same position, apparently, as the backwoods farmer who, in the density of his ignorant conservatism, believes that the public roads were built exclusively for him and his truck shelvings, and resents their use by anyone else as an encroachment on his rights. I hope you will realize, upon fair consideration, that this is a very important matter and has a serious bearing upon the progress of the times and people.

The horseless carriage is one of the greatest achievements of the age and its production has become one of the greatest and most valuable industries of our country. Many millions of dollars are now invested in it and hundreds of millions more will become involved in the development and perfection of this great means of locomotion and transportation.

It will contribute more and more to the happiness of life and the business necessities of mankind. It already employs many thousands of skilled mechanics and has opened up a vast and ever increasing source of profitable employment. It has and will continue to exert the greatest possible influence in the great cause of good roads which our State has so prided itself upon, and will in thousands of ways directly and indirectly exert itself in the development of our State and country.

In our State alone there are thousands of men of moderate means but of high standing and aspirations who have hitherto had no interest in the roads and have opposed their improvement and resisted taxation for that purpose, but who, having tasted the delights of automobiling, have at once become converted into the most ardent advocates of the good roads cause and of all other improvements of a public character which tend to improve the comfort, beauty and general attractiveness of our State.

No great improvement in the arts was ever introduced without incurring some

temporary opposition and probably some small evils which required a little time to overcome. There are always members of a great community who are lawless and careless of the rights and safety of others. It would seem, however, to be most foolish and wrong to restrict the whole community within such unreasonable limits as to practically deprive them of the advantages of the automobile and stop its proper and reasonable use within the State simply on account of the few lawless ones. It is not good legislation to impose a hardship on all because a few are liable to do or have done wrong. In framing this act I trust that your sense of fair minded public policy as well as your intelligence as a lawyer will impel you to ignore all narrow prejudice and impose only those requirements which shall be necessary to protect public safety. Will you please furnish me with a copy of the bill as now introduced by you, and give me and all others interested an opportunity to be heard before the committee to whom it was referred, and oblige.

Yours very truly,

CHARLES S. KING.

A User on Two Cycle Engines.

Editor HORSELESS AGE:

I was very much interested in E. W. Roberts' discussion of the two cycle engine in your issue of January 14, and, as you left the subject open to the opinion of users, I am pleased to give my experience.

I purchased an automobile with this type of engine, believing that it was simpler in construction and would be less liable to get out of working order than the four cycle (a very important factor in running an automobile); also that it would give more power in proportion to its weight than the other.

In all of this I have not been mistaken. I have run my auto for nearly one year, or about 3,500 miles, and only twice have I had occasion to touch it with a screwdriver or wrench, and this only to tighten the screw that holds the igniter spring, which had worked loose; and each time it took but a minute to remedy the difficulty.

Gas engine troubles are generally hard to locate, and especially so to the inexperienced; therefore, the simpler the engine is in construction the better it is adapted for the work. Both times my engine failed to work I was able to locate the trouble in an instant. The only visible working parts being the igniters, these were looked after first and the trouble at once located, whereas if there had been a lot of other mechanism about the machine it would have been much harder to locate the trouble.

I have had some experience in running a stationary four cycle engine, and must say that I have not been so fortunate in always discovering the trouble when it gets out of order. It has quite frequently taken one to two hours to locate the trouble.

This calls to mind an incident which happened in a manufacturing establishment in our city not long ago. They had just installed a new 25 horse power engine, and after two hours of attempting to start it gave up in despair and sent for the engine doctor, who soon arrived and diagnosed the case as one of back firing. In their attempt to start the engine it had swung backward, thus throwing the igniter cam out of position.

Now, with the two cycle it does not seem to make any difference if it should happen to run backward, for mine has done this several times without the least injury.

However, I would say that I have been of the opinion that my machine heats up more quickly than the four cycle, but this is only a conjecture of mine, as I have never taken any lengthy trips behind a four cycle type, and am therefore hardly in a position to judge.

E. E. RUMSBERG.

Opposes the Proposed New Jersey Legislation.

CAMDEN, N. J., January 20, 1903.

Editor HORSELESS AGE:

The enclosed clipping is from the Philadelphia *Press* of January 20. Assemblyman Scovel has personally promised the writer to give the automobilists a hearing before his committee. On reading the clipping you will easily see what hardships the bill, if passed, would inflict on all automobilists. The road to Atlantic City is 60 miles long and perfect, and there will be many automobiles on that road during the coming summer. Not knowing this law, the prospects are that automobilists after having gone down the road a few miles, will be held up by some constable, and if they have not a license will be fined $50. Think of the annoyance of being held up every few miles, as one goes from township to township, by an officer demanding to see the license. Again, think of the absurdity of a 15 mile an hour limit down in the Jersey pines, where one does not see a house or man for miles. Something certainly should be done; the horse owners are against us and the public in general, so it must be done by those interested in motor cars. Horses are allowed to race at the rate of 25 miles an hour; trains run over grade crossings at the rate of 70 miles an hour; trolley cars at the rate of 30 miles an hour; bicycles at the rates of 25 miles an hour, and the poor automobilist is to be cut down to 15 miles, under severe penalty. Agitate this matter, and let us get together and fight for our rights.

OSCAR A. EASTLACK.

[From the Philadelphia Press.]

Assemblyman Scovel, of Camden, today introduced a bill providing that a board of automobile examiners be named by the Governor.

This board is to consist of five members, each of whom is to receive an annual salary of $500 a year. Before anyone can legally operate an automobile, locomob other horseless vehicle in New Jers must go before this board and be exar as to his fitness to operate a mac Upon the payment of $5 he will th given a license, which he can have ren annually upon the payment of a fee of

The proposed law fixes the maxi limit at which a horseless vehicle m operated on the roads of the State miles an hour.

Any person found operating a hor vehicle without a license may be arr by any constable or other law officer out waiting to swear out a warrant. provided that any mayor, recorder o lice magistrate may impose a fine o or imprisonment of thirty days, or for each offense. The conviction is final.

Trade Literature Received.

Cummings Cinch Tire Protector- Cummings Tire Manufacturing Com of 68 William street, New York city.

Steam Cars for 1903 (advance fold Locomobile Company of America, York city.

Automobile Supplies—Hussey Aut bile Supply Company, of Detroit, Mi

Evolution of the Gasoline Engine- Standard Motor Vehicle Company La Salle street, Chicago, Ill.

The Story of the Mobile—The M Company of America, Tarrytown o Hudson, N. Y.

The Locomobile Gasoline Touring —The Locomobile Company of Am 7 East Forty-second street, New city.

Drop Forgings—J. H. Williams & 9 Richards street, Brooklyn, N. Y.

J. & M. Panel Boards and Acces (for electrical installations)—Johns Morton, of Utica, N. Y.

The Spark Plug Picture Bookle W. King, M. E., Maywood, N. J.

Catalogue of Solar Lamps—B Brass Manufacturing Company, of nosha.

The Sandusky Runabout—The dusky Automobile Company, of dusky, Ohio.

Our Reliability Run—Duryea F Company, of Reading, Pa.

Schoeller High Grade Crucible Steel—The International Steel and chinery Company, of 245 Centre s New York city.

Automobile Lamps—Standard Ca Lamp Company, of Chicago, Ill.

Progressive Conservatives.

Motor cars played a prominent p the East Cambridgeshire poll on Ja 2. All told there were probably abou cars engaged, the majority being us the Conservative interest.—*Express.*

It is curious enough that the Con tive candidates should be the most gressive.

MINOR MENTION

P. C. Lewis, former manager of the Automobile Headquarters, Boston, died early last week.

It is reported that three-quarters of the space at the Boston Show has been allotted to exhibitors.

A. P. Underhill, treasurer of the Boston Automobile Dealers' Association, sailed for Jamaica on January 14.

We are in receipt of a copy of the "Report of the Director of the Office of Experiment Stations for 1902," by A. C. True.

Dr. Olmstead, of Spokane, Wash., writes that he has used a solution of common salt for two years as an anti-freeze mixture with perfect results.

The Cotta Automobile Company, Rockford, Ill., have just completed their first machine under the Cotta patents. The company have ten machines in course of construction.

A branch sales and storage depot of the Winton Motor Carriage Company, on Huron street, Cleveland, Ohio, will be opened on February 1, under the management of Charles B. Shanks.

The Willoughby Company, of Utica, N. Y., has been incorporated to make automobiles and other vehicles; capital, $160,000; directors, J. F. Maynard, J. A. Roberts, F. T. Proctor and T. R. Proctor, all of Utica.

T. W. Temple has succeeded the McPherson Cycle Company in their cycle and automobile business in McPherson, Kan. He has been an active partner in the firm since 1897, and makes a specialty of building automobiles to order.

V. G. Apple, of the Dayton Electrical Manufacturing Company, ascertained during Show week that among the gasoline cars exhibited eighty were equipped with generators and 106 with batteries only, a large increase in favor of generators as compared with last year.

At the annual meeting of the Ohio Oldsmobile Company, at Cleveland, on January 17, Peter R. Fahey was elected president, William G. Wilson vice president, and Ralph R. Owen secretary and treasurer, who, with W. D. McTighe and I. D. Owen, constitute the board of directors.

At a recent meeting of the Dayton Automobile Club a committee was appointed to arrange for a race meet at the Montgomery County Fair Grounds, Dayton, Ohio, on the afternoon of May 30, 1903. A guarantee fund was subscribed by members of the club and the success of the meet seems assured.

Among the recent New York State incorporations is that of the Morris-Corkhill Motor Company, of Rochester, with a capital of $5,000. The company will manufacture gas engines. The directors are Joshua M. Morris, Charles L. Reed, Thomas Corkhill, F. H. Clum, Samuel Kay and H. C. Spurr.

A special train carrying the automobiles exhibited at Madison Square Garden that are also to be exhibited at the Coliseum, in Chicago, in February, left the West Sixty-fifth street yards of the New York Central and Hudson River Railroad early on January 27. The train is to travel by day only and its arrival at all large cities en route will be announced.

Dr. Brandow, president of the Berkshire Automobile Club, Springfield, Mass., has appointed E. G. Breed, G. F. Hall and Alden Sampson as a committee on roads. It is stated that several members do not favor the erection of a new building in the spring, and at the next meeting will strongly urge that the club lease the double store in the Whelden Block.

LEGISLATIVE AND LEGAL.

The Corough (Pa.) Council has decided to adopt an ordinance regulating the speed of automobiles in passing through the borough.

Robert Jardine and H. O. Berg were arrested in New York on January 18, charged with exceeding the speed ordinance. Albert R. Shattuck furnished bail.

Peter Vachey, chauffeur of Louis Sherry, New York, was arrested on January 18 for speeding the Sherry automobile too fast on Melrose avenue. Mr. Sherry furnished $200 bail.

An ordinance adopted by the Chicago Board of Aldermen provides that every automobile shall display identification numbers and letters on the rear of the machine. On private vehicles the license number of the owner is to be shown, while on public automobiles the license number of the operator is to be exhibited with a mark denoting the owner. The numbers are to be lighted at night.

Representative Johnson has introduced in the Minnesota Legislature a bill which provides that the speed of automobiles shall be limited to 15 miles an hour in the country and 8 miles in the cities. Chauffeurs are obliged to bring their machines down to a 4 mile an hour speed at crossings and to come to a standstill when signaled by a driver of a team. Gasoline machines must be provided with mufflers to deaden the noise. The bill is similar to the ordinance recently introduced in the Minneapolis Council at the request of the members of the Automobile Club. The chief difference is that the ordinance allows machines to travel at the rate of 20 miles an hour in rural districts. The bill was referred to the committee on roads and bridges.

Edison Contra Jungner.

A reader of THE HORSELESS AGE sends us a copy of the January 3d issue of *Nya Dagligt Allahanda*, published in Stockholm, Sweden, which contains an article with the above heading. It appears that Edison and the Swedish inventor, Jungner, whose name has been mentioned in these columns repeatedly, are involved in a patent interference case, arising out of their respective inventions in the storage battery line. Some of our readers have intimated that we are neglecting the Edison battery inventions and these, at least, may be interested in some of the claims of a rival inventor or of his promoters, and we, therefore, give herewith some extracts from the article in question. The article appeared in English, and the extracts are given verbatim:

EDISON CONTRA JUNGNER.

During the years 1896-1900 a Swedish chemist Waldemar Jungner, made several discoveries and inventions in the electro chemical science, wich made quite a stir in the chemical circles. His aime was to invent a consistent and effective electric accumulator. All since the beginning of the electrical industry there has been a wish for such an accumulator.

In the mentioned battery Jungner used as insoluble positive electrode of a powdered high oxide of nickel and silver. But as this battery is expensive, and the asbestos paper, that separates the plates, is after about 120 discharges obliged to be changed, Jungner already the same autumne used only nickelperoxide as positive active metal, and iron (powdered) as negative metal. This combination is mentioned by Jungner in his swedish patent of the 21 Jan. 1901. According to the international patent rules this patent defends the priority of the same foreign patents, claimed by him during six months from the 21-1 1901.

It was, therefore, "postfestum," that T. A. Edison the 5:th of Feb. the same year gave in his patent letter; post festum as well according to the system as to the most details. According to the Jungner's company's claims of priority in the English patent office, Edison was obliged to put into his patent a large disclaim, which according to the system makes Edisonquite depending of the licences, he can get from the Jungner company. The german as well ass the english patent offices have evidently destroyed Edisons head claims.

The patent office of the United States has not agreed to Edisons claims, but has made him several disagreeable questions. Some particlars in the case between him and the Jungner will an interference jury decide.

Only in those countries, where patents are given "sans garantie de l'Etat," Edison has been "successfull" in his claims.

Just as severely as the European and the American technical press has demonstrated against Edisons priority, just as willingly

has the days-press lifted upp his invention among the wonders of the day.

There are many funny details from the patent fight. An example: the 20 Nov. 1900 Edison tried to get (and got) an accumulator patent in England; he claimed now for example as his invention the reduction of cupric carbonat by hydrogen! This way of reduction of cupper has been described in many english and german physical books from the middle of last century!

During the very latest times Edison has also discovered, that the powdered graphite, that Jungner uses, is not defined as being flaky. It is only a little misfortune, that graphite always is flaky, how finely it is powdered, depending on, that graphite has a flakelike crystal form.

The Jungner company hos not made any kind of demonstration against the praise Edisons accumulator invention has had in the press. At the same time an honest trial to shake hands with Edison in agreement has been made. Only at the patent offices has the Jungner company said "hands off" to E.

Edison is supposed to have said, that his accumulator is to be the monument on his grave. If so, we propose that following words, written in The Electrical World, New York (6:th April 1901) may be witten on the monument: "The Edison battery seems apparently to be identical with an accumulator, described in a Swedish patent to Schmidt-Jungner."

[And meanwhile the public is waiting for the batteries.—Ed.]

The Good Roads Movement in New York State.

According to the estimate of the State Engineer, the State of New York has approximately 75,000 miles of highway—that is, wagon roads—and to maintain the commercial supremacy of the State it is essential that those highways should be improved so that the farm produce may be more economically taken to the towns and railways. And there are other reasons why the highways should be improved.

Farming communities are unable to pay the cost of this improvement unaided, and the State therefore passed a law called the Higbie-Armstrong law, under which the State undertakes to pay half the cost of improving our roads. Since this law went into operation, some five years ago, 186 miles of State road have been built and 167 miles are in process of construction. Petitions have been received by the State Engineer for the improvement of highways amounting to 2,061 miles and the towns and counties have appropriated, or are ready to appropriate, the sum of $8,000,000 for this improvement, and are only waiting for the State to appropriate a like amount so that these roads may be built. Last year the State appropriated for this purpose the sum of $795,000, and if each year from now on a similar amount is appropriated it will take about ten years to complete all the roads petitioned for. Many of the farmers of the State feel that they cannot wait so long a time to have their roads improved.

Many counties and towns are desirous, under the Higbie-Armstrong act, of building long stretches of improved highways in their counties if it were possible to make the terms of payment such that there would be but a small increase per annum in the county and town charges. The fourth annual good roads convention of the boards of supervisors, held in Albany, January 20, advocated the issue on the part of the State of $50,000,000 of bonds, payable in fifty years at 3 per cent interest, with a sinking fund of 2 per cent. per year with which to pay the bonds, such bonds to be issued not to exceed $5,000,000 a year, and the interest and sinking fund for the redemption of the bonds to be provided according to the plan of the Higbie-Armstrong act, so that the State would have to pay 50 per cent. toward the retirement of the bonds and the interest, the counties 35 per cent. and the towns benefited 15 per cent.

The boards of supervisors state that this plan is exceedingly favorable to the counties and towns. If a county desires to build 25 miles of road at a cost of $200,000 it would be paid for by bonds issued under the above plan; half the amount, to wit, $100,000, would be charged against the State and the other half, $100,000, against the county and towns benefited, with an interest charge of 3 per cent. and a sinking fund or redemption charge of 2 per cent.; there would be an annual charge of 5 per cent. against the county and towns on the $100,000 of debt used to build 25 miles of road. This would amount to $5,000 a year. The county's portion of this would be $3,500 and the remaining $1,500 would be charged against the towns through which the road passed, according to the cost of the road in each town. The retirement of 2 per cent. of the principal of these bonds each year would constantly reduce this interest charge, and at the end of twenty-five years, when half of the bonds are paid, the county and towns would be paying $2,000 annually toward the sinking fund and $1,500 toward the interest, making a total annual charge of $3,500 per annum.

The plan is claimed to be favorable also to the State. Suppose the State issued $5,000,000 of good roads bonds annually on the above plan. The State would have to pay 3 per cent. interest and 2 per cent. sinking fund for the redemption of its half of these bonds each year. This would equal 5 per cent. on $2,500,000 of bonds and would be only $125,000 a year. In the course of six years if $30,000,000 of these bonds were issued the State would have to pay the interest and sinking fund amounting to 5 per cent. on half this sum, that is, $750,000 per annum, which is less than the amount of the good roads appropriation under the Higbie-Armstrong law last year, which amounted to $795,000.

Up to this time 186 miles of highway have been completed by State aid. The counties have petitioned for 2,414 miles of road, and $50,000,000 expended on the above plan would improve about one-tenth of the entire highway mileage of the State, making a system of 7,500 miles of splendid road, and this could be accomplished during a period of ten years to the immediate advantage of the State and at a small annual expenditure.

Parsons Skidding Preventer.

The Parsons side slip preventer, according to a description in the *Automotor Journal*, consists essentially of two hoops mounted on either side of the rims of the wheels. One of these hoops is endless, and is put on outside the inner rim of the wheel; the other loop, lying outside the rim, is provided with a coupling so that it can be adjusted to the rim. Lengths of fine mesh chain resembling curb chain are threaded across zigzagwise over the surface of the tire, the ends of the chain being attached to the hoops. The whole arrangement must be kept slack, so as to be capable of movement relatively to the tire.

In practice the chain embeds itself in the road surface at an angle to the direction in which the car is proceeding, and if there is danger of slip the chain at once stops it. At the same time there is a tendency for the hoops carrying the chains to run round slightly slower than the wheel itself—much the same thing, in fact, as occurs in the case of the rail ring tractor—consequently the chains do not continue to press on the same part of the tire. The wear is said to be very slight in consequence. Of course, the whole question practically resolves itself into one of wear and tear. If the chains last fairly well, and the life of the tires is not seriously interfered with, the invention ought to prove most successful, for when in use there seems to be no doubt that it is an absolute preventive. There may also be a slight tendency to diminish speed, as embedding the chain in the surface of the tire and also in the road surface must absorb a slight amount of energy. There is no reason to suppose, however, that this will prove an important matter.

The N. A. A. M. Annual Meeting.

On Saturday, January 24, a meeting of the National Association of Automobile Manufacturers was held, at which the question of the next Show was discussed. Windsor T. White, of Cleveland; F. S. Fish, of South Bend, Ind.; H. Ward Leonard and Lucius T. Gibbs, of New York, and I. H. Page, of Springfield, Mass., were elected to the executive committee for a term of three years. Mr. Page succeeds Walter C. Baker, of Cleveland, the only member not re-elected.

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Identification Numbers in Chicago.

The City Council of Chicago a short time ago adopted an ordinance requiring all automobiles operated within the city limits to be equipped with identification numbers 8 inches in height. It is unnecessary to say that the measure was strenuously opposed by the Chicago Automobile Club, but it passed, and would have caused Chicago automobilists a great deal of annoyance and made the city a laughing stock for the outside world had not Mayor Carter Harrison put his veto on the ordinance. Eight inch numbers! One humorously inclined might suggest that the size had been determined to correspond with the "magnificent distances" between habitations in the outlying districts of the Western city. But unfortunately the subject is an extremely serious one. There is little doubt that the aldermen were influenced in their action in connection with this ordinance by a desire to court favor with the laboring vote, by imposing annoying restrictions upon "the plaything of the rich." The veto of the mayor has killed this unreasonable measure, but the proposal to number automobiles is still claiming the attention of the council.

The substitute ordinance introduced proposes 4 inch numbers, but it, too, has met with determined opposition from the Chicago Automobile Club, except from the club's president, who is also a member of the council. The case furnishes another illustration of the biblical truth that no one can serve two masters. The president of the club as a member of a special committee of the City Council recommended the 4 inch number ordinance for passage, and by this action concentrated upon himself the wrath of the club. A number of somewhat strained communications between him and another officer of the club followed and the president has handed in his resignation.

It would be rather unfortunate if the numbering ordinance should be adopted in Chicago. It would establish an example that would undoubtedly be widely followed in the West. For purposes of identification numbers are really less satisfactory than initials, for if the suburban towns, Oak Park, Evanston, etc., should also decide to require numbering five or six vehicles with the same number might be traveling on the streets of Chicago at the same time. Owners prefer to carry initial plates and these have been introduced in a number of Eastern States at the recommendation of automobile clubs. The initial plate requirement is of American origin, while numbering is a foreign idea; for this reason, and also for the sake of uniformity, it is to be hoped that the Chicago Automobile Club may succeed in preventing the numbering ordinance from being passed.

Steam Condensers.

A reader, evidently a user of a steam carriage, writes that he would like to see described in THE HORSELESS AGE a good form of condenser for steam carriages, with apparatus for separating the lubricating oil from the condensed steam.

As far as we know, no "good form" of condenser with oil separator for attachment to the average light steam carriage is known. If there was, we would no doubt soon see them applied in large numbers, for nothing would be considered more desirable by most steam carriage owners than an increase in the mileage of their carriage on one charge of water. No particular difficulty attaches to the condensing problem, as sufficient cooling surface can be obtained with the ordinary flanged coil radiators to condense nearly all the steam, even on a hot day. The necessity of running without forced draught is sometimes a disadvantage, but the real difficulty hinges on the problem of effectively separating the lubricating oil from the steam. Lubricating oil in a fire or water tube boiler is known to cause foaming, while in a flash boiler up to a certain amount of oil is claimed to result in no harm. No device is known which will completely take the oil out of steam. The majority of oil separators (for stationary and marine purposes) are so con-

structed that the steam is led through a tortuous channel which causes the greater part of the oil to be deposited on the vertical walls of this channel; the oil runs to the bottom of the separator, from which it can be drawn off at intervals.

Many experiments have been made to fit condensers to steam carriages sold without them, but they have mostly only been partially successful. Meanwhile these experiments continue, while at the same time the manufacturers are fitting their latest models almost uniformly with condensers, which indicates that condensing is to be a common practice with steam automobiles in the near future. But at the present state of development of steam practice it is an impossibility to describe a "good form" of condenser with oil separator for use on older models of steam carriages.

Valve Cages.

A tendency in gasoline motor design which was quite noticeable at the Show was the construction of the intake valve seat and cap in such a manner that they can be removed from the engine without disturbing any connections. In a few engines the exhaust valves were constructed in similar manner.

The advantages of this arrangement are obvious. The time necessary for removing and replacing a valve is reduced to about one-half, and without the addition of any complications. In fact, the number of connections in a multiple cylinder engine may be reduced in number where this form of construction is employed. The cage consists of a cylindrical or slightly tapered metal chamber comprising the seat for the valve, the valve stem guide and in the case of intake valves sometimes also a cap enclosing the valve stem and spring. An opening is formed in the side wall of the chamber through which its interior communicates with a passage in the cylinder head or valve chamber casting. It is obvious that in a multiple cylinder engine in which the various cylinders are all in one casting all the valve cages can be placed in communication with each other by a single passage cast in the cylinder head, so that only a single pipe connection need be made from the carburetor to the engine and the necessity for manifolds is avoided.

In most cases the cages are held in place by an adaptation of the yoke and clamp screw device so familiar in connection with French motors, but in one instance a form of gun breech joint was employed. The cage is provided with a sort of panhandle, which, when turned about one-eighth of a revolution, permits lifting the cage out. If the cages will stay in place on the road, about which, the exhibitors claimed, there was no question, this construction certainly constitutes a great advance in design as regards accessibility of valves. The spark plugs in this particular motor are fitted into the valve chamber wall with the same form of joint.

Back Firing, a Much Misapplied Term.

The word back firing is applied in automobile terminology to three distinct phenomena. It was originally used in connection with gasoline engines, to denote the fact that the inflammable mixture in the carburetor and intake passage had become ignited, owing to imperfect closing of the intake valve or the production of a spark at the wrong time. In connection with two cycle engines the term back firing is used to convey that the flame has passed into the crank chamber and ignited the charge therein.

Users of steam carriages also use the term back firing with reference to the burners of their machines. Everybody who has used a laboratory Bunsen gas burner knows that sometimes in adjusting the flow of gas to the burner the flame travels down the tube of the burner to the air openings at the base of the tube and burns there with a roaring noise. Similarly, in a steam carriage burner the flame, especially if the top plate of the burner has become leaky, will sometimes travel back through the mixing chamber to the mixing tube opening, and burn there, when the burner is said to be back firing.

In connection with gasoline automobiles the term back firing is sometimes also used—particularly in catalogues—to describe what is more generally and more properly referred to as a back kick of the motor. When the motor is being started by turning it over by hand, if the ignition occurs too early the starting crank may be jerked from the hands of the person trying to start the motor and the crank turn over in the wrong direction. The term back firing should never be used to designate such an occurrence, as the use of the word for this purpose is likely to create confusion. Without this application the term back firing has a de as applied either to gasol automobiles, and all cause standing is avoided.

Positively Driven Ci Pumps.

It is quite evident from the of 1903 gasoline vehicle moc published in a recent issue driving of circulating pum cally been abandoned. Tl gasoline vehicle constructio from France, along with th pump circulation having be duced abroad. It has bee while friction driving is alv less unreliable, it is particul applied to these pumps, one being that the lubrication shaft is fraught with difficult always carried out properly.

The circulating system has so arranged that if the pur water would continue to thermo-siphon action, but in the circulation is necessarily than when the pump is worl water soon boils away. Test unreliability of the friction culating pumps is to be four pearance upon the market indicators, although these ins serve to guard against the c lecting to renew his supply time. Many mishaps have be the friction drive of a pump burning the gasket to cutting and exhaust valve, and in fact the abandonment of fri for this purpose is a step tl prove satisfactory.

The Development of the cial Gasoline Autor

By Albert L. Cloug

There is hardly a problem o ine interest than that of the motor vehicle, both as an eco recreative factor. It is not natur this future depends upon the d ability and durability attained anism, and probably nine-ten who speak of the "perfection of bile" refer implicitly to just thi provement, and have in mind of simple and infallible ignitio carburetors which can never flood, transmission gears v strip their gears or require lubricating systems that are "s and taxes," and everything

tributes to certainty in getting there and getting back.

This sort of thing is, in very truth, the "perfection of the automobile," but it hardly seems, at this late day, that the working out of the details of the mechanical construction of these vehicles is actually the factor destined to determine most decisively the future adoption or rejection of mechanical propulsion. The well informed people must be few indeed who doubt the almost immediate attainment by the hydrocarbon vehicle of a degree of reliability such as to warrant its early and widespread adoption in the world's work. It is pretty evident that we now have at hand, without exception, all the essential elements of a useful and dependable motor vehicle, and that if these are combined with honesty, care and a fair degree of engineering skill, and the finished product handled by an operator possessing due mechanical training, the results may soon be expected to prove "commercial" as far as the performance of the mechanism is concerned.

There cannot be much doubt that the hydrocarbon motor which will ignite continuously for a couple of hours at present can be made to do so for a couple of days or a couple of weeks, after well known precautions are conscientiously applied. It has been a common fact in the history of invention that the working out of the details of an idea which is sound at bottom (no matter how impractical it may look) is sure to speedily take place, but that no amount of painful puttering can make practically operative the idea that has a fallacy in it. The conception of the hydrocarbon vehicle is sound and practical and, most important of all, it is thermodynamically correct. It is just as certain to have its crudities smoothed away as was the sewing machine and the harvester. It is sure so to do despite the claim that it is "complicated." Simplicity seems to be worshipped as a fetich in some quarters. The only virtue there is in simplicity is that it affords less opportunities for poor workmanship and bad engineering. With perfect workmanship and rational engineering, complication involves no unreliability that is not doubly paid for by the larger results obtained. The perfection of the details of the mechanism of the hydrocarbon vehicle will prove the result of a natural process of evolution taking place in the factory and repair shop and may safely be regarded as certain.

One must needs look a little deeper than the superficial weaknesses of the motor vehicle to discern the factors which are to decide favorably or adversely as to the fitness of the automobile for universal adoption. Back of all this criticism of details will be found four questions of such an intensely vital character as to carry in their solution the fate of the whole movement:

(1) The fuel question.
(2) The tire problem.
(3) The problem of traction in snow.
(4) The problem of intelligent operators.

THE FUEL QUESTION.

It is perfectly astounding the slight attention that is accorded to the matter of fuels in this country, but it is merely an indication of the dilettante way in which the motor carriage industry has been conducted thus far. If acetylene be excepted, the internal combustion motor is absolutely confined to the use of liquid fuels—that is to hydrocarbons and alcohol. In America, up to the present time, not an internal combustion carriage motor is produced commercially which can operate with any other fuel than gasoline, and many of them require gasoline of the highest volatility. The hydrocarbon motor is thus confined to the use of a fuel which constitutes hardly a twentieth part of the product of certain specially favored petroleum wells which are already well advanced toward exhaustion. The oils of Texas and California, of comparatively recent discovery, add nothing substantial to the visible supply. As far as we know, the supply of gasoline is strictly limited by nature to an amount laughingly inadequate to cut any figure in furnishing the energy necessary to replace animal traction. The supply of acetylene is, on the other hand, limited only by the available supply of cheap water power and the supply of alcohol is restricted only by the land available for raising vegetable forms containing starch. Depending upon gasoline as the motor fuel of the future would be about like looking to the supply of hickory wood for the heating of all the buildings of the world. It would be about as practical a proposition to try to feed the world's population on flavoring extracts as to try to perform the pleasure and business transportation of the world with gasoline. Even acetylene has more of a future. As long as gasoline is the only fuel used, the hydrocarbon motor carriage can have no commercial side worthy of serious contemplation. When its palate becomes less epicurean and it learns to subsist upon crude petroleum, kerosene, distillate and denaturized alcohol, it will be open to business engagements. Its less sporty relative, the stationary gas engine, has long been used to a less racy fare and has not known the unquiet influences of the race track. The oil as it comes from the well is good enough to do the real work of life on.

Speaking of the use of denaturized alcohol as fuel, one can entertain little hope that we will live to see it in this country. What a fluttering of white ribbons and what resolutions there would be at the mere idea of having cheap alcohol about, no matter how nauseatingly it were impregnated with "corpse oil"! Verily, there are starting cranks and some other kinds!

A great many people refuse to consider the fuel question at all; their bills for gasoline are such a small part of the total. It is perfectly true that the expense of those highly vulnerable wind bags we try to keep on the wheels is not in the same class with fuel outlay. Neither is the cost of repairs, incident upon the periodical rebuilding of engines and transmissions which fall apart through congenital weakness. But when the automobile gives up "this sporting life" and "settles down" it will be upon a tire which is not afraid of a pin prick and with a motor which, while perhaps a little "slow" in disposition, will not rapidly shake itself apart.

Wait until the powers that be "jump" the price of gasoline skyward a few times more and then let us see whether the fuel problem is worth talking about or not.

It is not a wild prediction that with the business automobile of the future the two largest items of expense shall be for the operator and the fuel, with depreciation and repairs secondary. Distillates or crude petroleum will probably be used and gasoline will be reserved for cleaning gloves.

THE TIRE PROBLEM.

Not much need be said about the tire problem. Hardly anyone would care to deny that it's successful solution would open wide the world of business and pleasure to the new mode of transportation. Under present conditions the automobile has practically no field of actual utility, and the lack of serviceable tires is the main cause. The Endurance Contest Committee of the A. C. A. has recognized the supreme importance of the tire problem in its recommendations for future tests. To secure resiliency, combined with durability and reliability, is indeed a hard nut to crack. The qualities demanded seem to be antagonistic. Resiliency is only secured at the cost of rapid wear, of expensive material and the likelihood of complete failure. On the other hand, the protection of the driving mechanism, the demand for quieter streets and the necessity of a high tractive coefficient seem to imperatively call for a somewhat yielding tire upon all vehicles. It requires more credulity than the writer possesses to believe that the present day pneumatic tire is going to figure in the serious development of the automobile. The production of a material more resistant than rubber and equally resilient is a hitherto unrealized dream, but there seems to be no obvious impossibility about it. Perhaps some such material may yet be discovered or some known material may be applied so as to be cheap and effective. At any rate, there must needs be a revolution in automobile tires.

TRACTION IN SNOW.

The north temperate zone is the seat of the civilization and commercial activity of the human race, and throughout the greater part of its extent the roads are at times covered more or less deeply with snow. It is undenied that in order to supplant animal traction the motor vehicle must be able to successfully cope with these conditions. The two requirements which are necessitated are plenty of power and tires which shall afford the necessary

adhesion. The former requirement can always be met by a due sacrifice of speed, and it is hardly to be doubted that our present vehicles, by a readily effected change of gear, could negotiate all depths of snow successfully. As to securing the necessary traction under all conditions of snow and slush, there is more room for doubt. Whether the result will be accomplished by providing the ordinary tires with some readily attachable and durable arrangement capable of gripping the snow, or whether the ordinary rims and tires will be capable of easy removal and replacement by special snow rims and tires, not necessarily of a resilient character, it is impossible to predict at present. It is likely, however, that the snow problem may not prove so hard a one as the provision of proper tires for ordinary use, contrary to the general belief.

INTELLIGENT OPERATORS.

The difficulty of providing intelligent operators for the vast number of motor propelled vehicles, especially business wagons, which the future will call into being cannot possibly be overestimated. Not only is an animal to a large extent an automatic motor, but it also possesses a considerable degree of intelligence. The horse can not only take care of himself under ordinary circumstances, but can actually assist the man who drives him. A drunken driver is comparatively safe behind a horse, but what can be more terrific to contemplate than the possibility of the driver of a 30 horse power auto truck who had imbibed too freely attempting to operate on Broadway?

Not only must all the animal intelligence be supplanted by human intelligence, but a totally different kind of training must be developed to meet the peculiar qualities of the mechanism. When the inferior intelligence and irregular habits possessed by the class that handles the horse drawn traffic is realized it immediately becomes apparent that a colossal development of mechanical understanding must take place before the automobile shall triumph.

We have a prime mover that is good enough. With plenty of cheap fuel, practicable tires for summer and winter and skillful operators the horseless age shall not be long delayed.

There is talk of holding an Automobile Show at Rochester, N. Y., beginning March 2.

Defective Water Circulation.

By C. Will Travis.

If we work upon a basis of a maximum rise of temperature of 80°, the quantity of water and the amount of radiating surface required to properly cool a gasoline engine of any given size without having to replenish the water supply for a period of twelve hours is a problem of such easy solution that it is surprising to find that even machines which have been sent from the factory but yesterday have often an inadequate but more frequently a defective cooling system.

In the majority of cases the defect is due more to disregard of common natural laws in the laying out of the cooling system comprising the radiating coil, pump, tank and piping, with reference to the engine, than to any lack of radiating surface or quantity of cooling medium.

Such defective arrangements often cause air traps or steam pockets to be formed, by which the back pressure upon the circulation is greatly increased. In fact, one sometimes meets with arrangements of piping that no plumber or steam fitter could be guilty of and retain his license to do business in any community.

It is my object in the present article to point out the causes for some of the deficiencies in cooling systems and suggest at least one feature which will in a measure greatly improve many of the systems in use at present.

Of eight different gasoline vehicles examined with reference to this subject only one had the radiating coil, pump, tank and piping constructed in such a manner that the entire system could be filled without causing an air trap to be formed in some one or more of its component parts, and so that when the drain cocks were opened the entire system would be completely drained and not retain enough water in some parts to do damage in case it should freeze.

In five of the machines referred to a one-eighth of an inch stand pipe, varying in position and in length from 14 to 20 inches, as each case demanded, entirely eliminated the air pocket trouble, permitting the entire system to be filled with water without the necessity of shaking it down to force out the air, and giving the water when in circulation the benefit of the entire radiating surface of the coil.

One of the eight machines, an American three cylinder, $2,500 car of 1901 vintage, which had seen about eighteen months' service in the East before it was brought to this locality, had a cooling water capacity of 10 gallons, the tank being located forward and at the lowest point of the circulating system. The tank would insist upon belching half of the water out of the overflow pipe within less than an hour from the start and the engine would get too hot for proper operation before the end of the third hour, which made it necessary to refill the system inside of that time.

The fact that the water belched out of the overflow pipe indicates that the complete filling of the system was always a slow process, owing to the air trap in the top of the coil and tank.

It is really beyond understanding how this machine could so long have continued in service in the East without some one of its various operators finding the remedy for so serious a defect—the application of such a simple thing as a stand pipe from the top of the tank to the top of the filling tube, and a relief cock at the top of the coil.

It required less than two hours' work, two eighth-inch elbows, one-eighth inch air cock, two 6 inch lengths of one-eighth inch pipe and 12 inches of rubber tubing to place this system in such a condition that the water supply required no renewal in twelve hours' of continuous service.

The introduction of the stand pipe permits the escape of all air, greatly improves the circulation, and in a measure prevents the pocketing of steam in the coil; but it will not remedy defects due to an impracticable arrangement of piping. The piping must be laid out in such a manner as to form for the circulating medium a path of least resistance, or the engine will be deprived of some of the value of the cooling system.

A common form of cooling system is illustrated in Fig. 1. The stand pipe F is not a part of the regular system, but if the cock is closed the effect is the same as if the stand pipe was not there. Where the construction of the vehicle will permit it, it is advisable to return the stand pipe into the top of the tank and thus do away with the necessity for the air cock.

When the vehicle is standing on a horizontal plane, as indicated by the line A A', and the air cock at F is closed, in filling the system it will be found that a part of the water will run into and fill the pump and piping adjacent to the tank while at the same time the greater part of the water is seeking its lowest level through the cylinder jacket and connections to the coil, and in this manner an air trap is formed by the pump and connections along the line E E. The air remaining in the coil, in order to escape, must pass through this trap in opposition to the action of the pump; otherwise it will remain in the coil, decreasing the defective radiating surface and retarding the circulation.

By opening the air cock at F the whole system can be readily filled and any steam

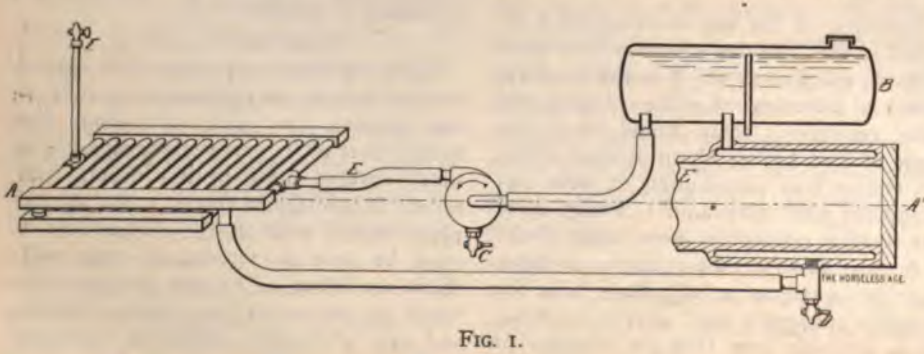


Fig. 1.

that may collect will be permitted to escape; at the same time the water receives the benefit of the entire radiating surface of the coil. It may be well to add that this system can be filled almost just as well without the aid of a stand pipe if the part A be raised to the same horizontal plane with B; in other words, by elevating the front of the vehicle until the forward part of the coil is nearly on a level with the rear of the tank. When the vehicle is in such a position the weight of the water will force the air out of the system.

Were the ease of filling the only advantage to recommend the stand pipe its introduction would be well worth while; but to insure ease of filling is only a minor function of the stand pipe and its universal adoption is deserving of serious consideration. It is to be regretted that in many instances the stand pipe does not much improve the drainage of the system, for although it permits of a slightly freer flow of the water the coil will retain the same amount of water after the flow at C and D has ceased whether F has remained opened or closed during the process, and the amount of water retained will be much greater in case the vehicle was not standing in a perfectly horizontal position when being drained.

This would indicate that the chief defect in this particular system lies in the application of the radiating coil; or, to be more concise, in the manner of connecting up the coil and in its location relatively to the pump and cylinder connections. A few slight changes in the location of the parts and their connections would produce a system which for circulation and drainage would approach the ideal.

In Fig. 2 is illustrated the same system with some slight alterations. It is shown to comprise two sections of really fine radiating coil, but the value of the system is greatly reduced by the arrangement of the whole, and the same defects occur as with the previously described system. A few words in regard to the air outlet and drainage will suffice.

As with the arrangement shown in Fig. 1, it is found that the introduction of a stand pipe, or a return from C to the top of the tank, as indicated by dotted lines, would not only facilitate the filling of the system but would greatly increase the circulation and the range which might be attained on one supply of water.

The drainage of this coil is even worse than that of the coil in the former case, although an additional outlet has been provided at B. As will be seen by referring to the figure, the water from the pump enters the top section of the coil at A, traverses it from left to right, then from right to left, and so on, until it reaches C, where it starts upon the return through the lower section to B. As there is no connection between A and B except through C, it will be evident that the top section cannot be drained unless it is provided with an independent outlet at its lowest point. An out-

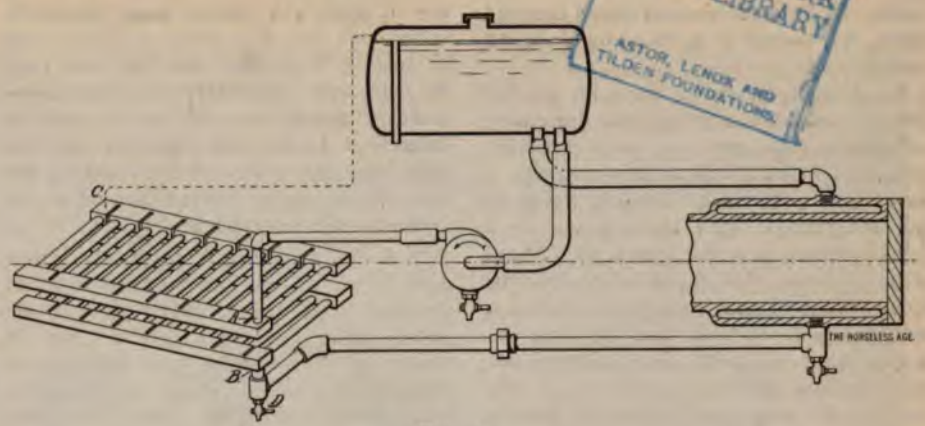


Fig. 2.

let was provided to permit perfect drainage of the top section of the coil, and then the pipe leading from the pump to A, the entrance to the coil, was replaced by a straight pipe from the pump to the L, and the bend to correct the angle at which the coil is placed was made between the L and A. Thus with the aid of a stand pipe and four openings satisfactory drainage was secured.

This brings up the question of whether it is advisable to have a multiplicity of drain cocks, one for each trap in a system, which is a very roundabout solution of the problem, when the same object can be accomplished in a much better way.

By a close observation of the common laws of gravity and of water circulation the cooling system can be so constructed and applied, with the same materials and at no greater expense to the producer, that it will embody ease of circulation, with only two drain openings at the most, allow the system to be filled without air trapping, make steam pockets impossible and give a still greater service of the same water supply.

As the varying conditions in vehicle construction require the adoption of each radiating system to conform largely to the shape and style of the machine, it would be impossible to sketch a system that might be used to advantage as a basis upon which all might work. Each case must receive an individual treatment.

Comments on "A Personal Ideal."

By Robin Damon.

I have read with much interest the article in your issue of December 31, wherein Albert L. Clough tells what he would like to have as an automobile—his ideal, in fact.

Mr. Clough certainly desires a good machine, containing many excellent points, which he will not find gathered under one body now. Yet I think that the average builder of first class machines has incorporated many of the suggestions outlined by Mr. Clough.

Take, for instance, the running gear. I have a carriage built three years ago, at a time when automobile ideas were in a chaotic state, yet the running gear is now as stiff and stanch as it was the day I received the machine, and I cannot recollect that I have ever been bothered with any weakness in that part of the carriage. I once ran into a stone post and snapped off the post, the only injury to the running gear being a few kinks in the front axle that were easily straightened out. I was at the time traveling fully 10 miles an hour.

Another time I started to climb a big tree, and did manage to get up a few feet, while trying to get out of the way of a frightened horse. The result was a slightly sprung axle, not so serious as to interfere with the running of the carriage. The same carriage once tipped bottom side up after climbing a ledge. Still, with all the tremendous shocks received, the axles, reaches and wheels are now in excellent condition. With another machine of the same make I once bunted into an electric car, head on. The car was lifted off the rails and the fender and dasher smashed off. I lost a few splinters of wood from the front box.

The instances I have cited are certainly good evidence toward justifying my idea that the first efforts in automobiles were on lines closely following Mr. Clough's theories, so he will not have to lose years of time waiting for a strong running gear.

I have ridden hundreds of miles in an automobile with the usual style of springs and carried a number of passengers, and I never heard a complaint about the springs. I am inclined to the belief that the spring question, so far as riding qualities are concerned, is fairly well settled. I certainly do not believe that a full platform spring for the front axle would be desirable, because it would wobble around too much. I have never observed that there was too little flexibility in the springs of any carriage I was in. On the contrary, I have often thought that stiffer springs would be better, for light springs strike together and also give the body a swaying motion, which is both unpleasant and dangerous. With heavy tires, good upholstery and springs so adjusted that they give evenly and gently, instead of swinging like a buckboard, the passengers cannot find much fault. It would certainly be out of the question to attempt to use springs flexible enough to permit fast running on rough

roads. If the roads are not suited to good speed, they cannot be made so by changing springs.

Mr. Clough, when he gives his idea of the rear axle, comes pretty near describing the construction used on many carriages, so he might be suited in that respect. I have spent quite a lot of money trying to use differentials with bevel gears, so I think I should pass that feature by. About all my trouble from the differentials came from having the gears enclosed, because it was impossible to know that anything was wrong until the teeth were stripped off. If covers are used they should be so constructed that they can be taken off quickly. Mine had a dozen or so bolts to take out. After being stalled away from home twice I left off the covers, so that when the carriage was washed the cleaner could examine things and tighten set screws if they were loose, instead of letting the screws fall out and smash the gears. Roller bearings may be good if well made, but I have had some hard experiences with them, being forced to put on an entire new rear axle and tubing because one of the bearings was broken, and the parts chewed up everything before the trouble was discovered. I believe I should prefer a plain bearing, even if it did take a bit more power.

On the wheel question I believe I can speak with confidence, for I have had four automobiles, all with wire wheels, and so far I have never spent a cent on them for repairs, even after running into posts, trees and electric cars. I cannot conceive how any wheel could do better. I know of a carriage built away back in 1898 with wire wheels that are now solid as rocks, and the machine has been used hard by different owners.

I do not think Mr. Clough gave attention enough to the tire question, because, after he had used his 34x4 inch ones a few weeks, he might be obliged to buy a new set at $35 per tire. The ideal tire will be one that will not puncture and that will give long mileage, just as the tires used on horse drawn vehicles do.

The steering apparatus of all my carriages has always held together, so I conclude that the iron work is strong enough. Mr. Clough's notion of providing something to take up lost motion is excellent, and I guess he could sell a perfect plan to many makers, for I have never seen a carriage steered with a wheel that did not have that defect in more or less serious form.

The brake question is a serious matter—more so than some builders imagine. My experience has been that no part of the machine gives more bother than the brake, especially in traveling on roads where there are many hills. Either the shoes wear off, the rod bends or snaps off, or pins or bolts fall out. I have had both brakes give out and been obliged to use the reverse quite often.

As far as I can see, the style of the engine is not of so much consequence as the way it acts. An engine lying peacefully under one's feet may refuse to revolve and be just as cranky as one that sits over the front axle. Whether it is a double opposed or upright triple seems to make no difference. I have seen men working over both types and I haven't been able to decide which was the better place for the motive power to be located.

It seems as though makers had now done quite well on the machine work of carriages, and the electrical devices are rather satisfactory when they are kept in condition. I have used both systems and I have never been troubled much with the make and break spark, while the jump spark brought out a few extra gray hairs when it had tantrums in the night time with a heavy rain falling. I think I should prefer the make and break in my ideal automobile.

I have experimented considerably with transmission devices made by different makers. I found that the loss of power from friction was considerable, even when everything was in the best of order. On long trips, with either dust or mud, the friction is greatly increased. Once I found gears running in oil that were smoking hot, because a lot of grit had found its way to the gears, even though the case was understood to be dust tight.

I disconnected everything from the main shaft except the high speed, and found that on ordinary roads I could get along well enough with one speed, climbing hills that had always required the lower speeds. On this account my ideal automobile will have its low speed and reverse entirely independent of the high speed, so that when either is in use the other will be at rest. I have a notion that an engine with three or four cylinders could be built with sufficient power to run an automobile with a single speed, much as a steam engine does.

The case for the chain would be an excellent idea if there was never occasion to repair the chain. I once had an automobile that had so many cases it was almost like a mummy. I couldn't even see the circulating pump belt, and there was never a drop of grease showing when the screens were lifted off. After a few weeks I was obliged to make repairs in the country. The cleverly designed covers were firmly riveted to different parts of the engine and frame, but I managed to cut them off with a chisel, and they were thrown into a field. After that I could see at a glance if things were in place, and it did not take much time to wipe over the machinery after a run.

If Mr. Clough puts the water tank under the dash, why does he bother with unreliable radiators? A tank with holes in it will let the air circulate, and thus save using radiators.

I do not think Mr. Clough need be discouraged, for many builders are even now turning out machines embodying many of his pet notions, although perhaps he cannot find all of them assembled in a single carriage. I have used one automobile three years, and it is today in better running condition than it was when I bought it. The machine has been through hard experiences, traveled many miles of rough roads and always been run to its limit of speed. Of course many repairs have been made and new parts put in, but with a few exceptions I think Mr. Clough's ideal carriage would require about as much work on it if given the same duty to perform every day. No machine can be built that will run day after day at high speeds over even the best roads in the world without showing wear and requiring much attention. Those who are waiting for such a carriage will be disappointed. Iron and steel can stand a good deal, but there is a limit beyond which they cannot be forced without danger, no matter how good the work and stock may be.

I suppose if an automobile could be built so that it would be absolutely dust tight it would be a tremendous improvement, but that is well nigh impossible. Dust works mischief to the bearings, and other troubles follow.

I think I have written before that I should be satisfied with an automobile that would run fairly well most of the time, and that I should expect to be called upon to do something or other occasionally. I have not bothered myself to set up an ideal, because I know that it would never be found.

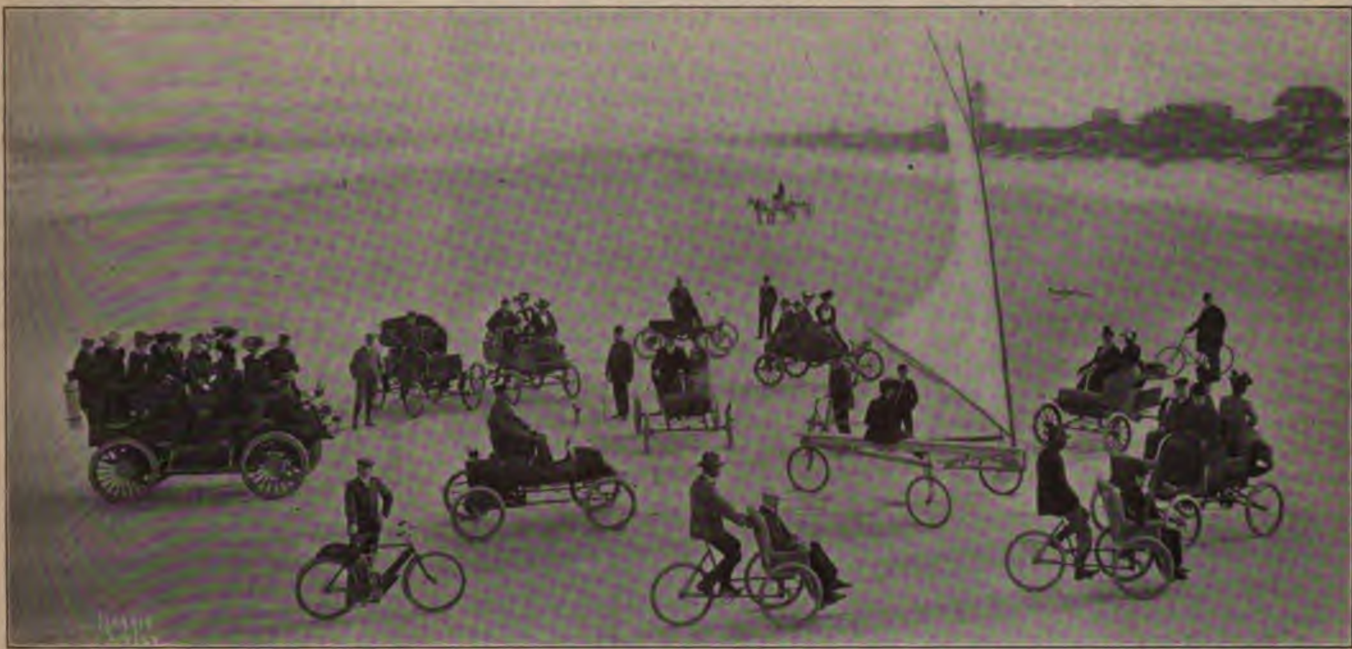
The Automobile in Florida.

(Communicated.)

When the cold weather in the North interferes with the pleasure of using the auto there is a winter paradise to be found at Daytona, Fla., where the enthusiast can run his machine nearly every day in the year. From December 12 to January 16 this season there have been but three stormy days, and most of the time the noon temperature has ranged from 50° to 80°.

Daytona has a population of over 4,000, composed largely of winter residents from all over the country. Its streets and avenues are laid out 100 feet wide, well graded, with many miles of smooth marled and shell roads. The town lies parallel with the Halifax River on its west bank and extends for 2 miles along the shore. It is situated in a forest of large live oaks covered with hanging moss that overhangs the streets and walks. Among them are many orange trees, palms and palmettos, sweet bay trees, magnolias, holly trees, trumpet vines and wild grapes. The roses are always in bloom and the vegetable gardens look like midsummer in the North.

Daytona Beach is reached by three bridges that cross the Halifax River within a distance of 2 miles. The river is about half a mile wide here and the beach is 1 mile from town over smooth streets and avenues. The South Bridge Company



Daytona Automobile Club on the Beach, 500 Feet in Width and 30 Miles in Length. One of the Finest Automobile Courses in the World.

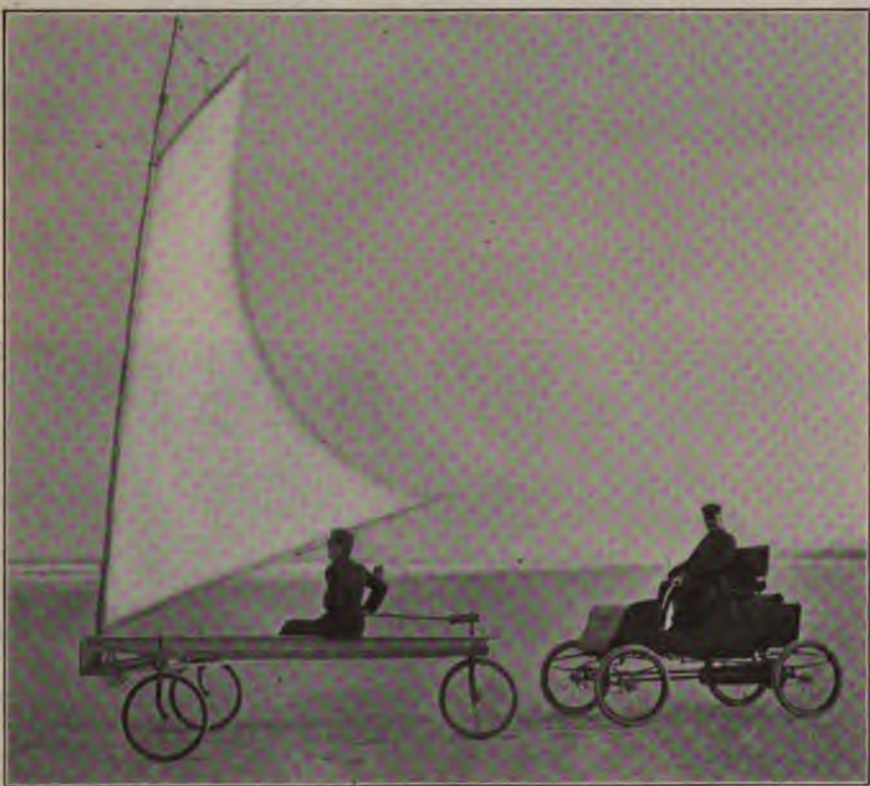
A View in Daytona, Fla., Showing a Section of Orange Avenue.

have recently built a bridge over the soft sand on the edge of the beach, so that an auto or a wheel can get onto the hard sand without any difficulty. The beach is the finest in the world, and is a continuation of the famous Ormond Beach, so well known in connection with the Hotel Ormond, which is located on the Halifax 6 miles north of Daytona. It extends along the coast for more than 30 miles in a straight line, and is from 400 to 600 feet wide at low water. The average rise of the tide is about 2 feet. There is always a good beach for riding several hours every day. The sand is nearly as hard as asphalt and very smooth. There are no stones whatever. The beach is so wide and smooth that it does not require much nerve to run your machine to the limit. Imagine a boulevard 500 feet wide, dead level for 30 miles, smooth as a floor There is an auto here that weighs 5,000 pounds, and it makes no impression on the hard sand of the beach. It is an ideal race course and the place where world's records will be made in the future. One can sit still on a bicycle and coast for 30 miles at great speed by the force of the wind, when there is a strong north or south wind.

J. F. Hathaway, of Somerville, Mass., is here with his Stanley steam carriage, which has a record on the Narragansett Park, Providence, R. I., of a mile in one minute and thirty-one seconds. He recently ran it a mile on the beach here in one minute and fourteen and two-fifths seconds with the machine in exactly the same condition and with the same power as at Providence. This last mile was run before the wind blowing about 50 miles an hour, so there was practically no air resistance. Mr. Hathaway has employed Engineer Rogers to survey a 5 mile course on the beach going south from a point near the south bridge, and has erected sign posts at each half mile up to 5 miles. J. C. Pettepher, of Daytona, has a good auto station in a fireproof building, with good facilities for taking care of machines and making ordinary repairs. The Clyde line steamers from Boston and New York will bring a light runabout on the wheels to Daytona, not exceeding 1,000 pounds in weight, for from $20 to $30. There are about a dozen autos here at present and more coming soon. In a few years this will surely be the Mecca in winter for the automobilist.

There are other pleasures here besides the auto. The fishing has been good all winter. From the three bridges you can catch plenty of small fish and some large ones. From the ocean piers sea bass are caught in large numbers nearly every day that weigh from 20 to 40 pounds each. There are many pleasure boats and launches that make regular trips or can be chartered for private parties. The Halifax River Yacht Club has a commodious clubhouse and nearly 100 members. Its fleet is composed very largely of launches.

E. D. Mills has an auto that uses neither steam, gasoline nor electricity. It goes by wind and is capable of great speed when the wind is on her quarter. Mr. Hathaway is familiar with the ice boats of the North and says this comes very near them. The ice boat is probably faster in the same wind, but this kind of an auto is a great novelty and there is rare sport in running it.



A Pair of Flyers on Daytona Beach.

Interviews on the Show.

(Concluded.)

A. R. BANGS,

who has recently taken the Boston agency for the Franklin gasoline machine, was at the show all week looking for an additional gasoline vehicle agency. The show, he thought, was very representative, and the man who came to secure an agency had a chance of seeing pretty nearly all the machines on the market that merit investigation. "The industry is now getting on a firm basis and the public is rapidly being educated. Some of the lighter and cheaper machines have been a great factor in the education of automobilists; you will notice that most people who have owned one of them one season want something better for the next. Simplicity remains a characteristic of the American machines, and the American manufacturers have made most rapid progress during the last year. As a tendency in body design I noticed that a number of tonneaus were shown with side entrance, which seems to be an excellent feature. There were many people here from Boston. The attendance has been very good and many sales have been made."

DR F. L. SWEANY,

of Philadelphia, came down to see what there was new to be seen at the show and to buy if something struck his fancy. He thought that in general the show reflected wonderful progress in automobile construction, and that particular attention seemed to have been given to the finish of the cars by the manufacturers. "However, for a man of my class, who wants to use his machine day in and day out, over all kinds of roads, the finish cuts less figure than the way in which the working parts stand up. But in this respect there has also been constant improvement, and remaining weaknesses are being eliminated all the time."

HARRY H. MUNDY, UTICA, N. Y.

"From my observations it will only be a matter of two or three years before we will equal and surpass the foreign builders."

German Endurance Contest.

Under the auspices of the Bavarian Automobile Club an endurance contest on the lines of the New York-Boston contest will be held during the comming summer, and the following itinerary has been decided upon; First day, Leipsic, Halle, Berlin; second day, Berlin, Hanover; third day, Hanover, Cologne; fourth day, Cologne, Frankfort-on-Main; fifth day, Frankfort, Stuttgart; sixth and last day, Stuttgart, Munich. Immunity from delays on the road will be the basis of awards, but tire troubles will not be penalized. Every vehicle completing at least two stages of the run will receive a "handsomely engraved" certificate. The entry fee is 30 marks until March 1, and twice this amount thereafter.

LESSONS OF THE ∴ ROAD ∴

The Essence of Five Years' Experience with Fifteen Different Machines.

By Dr. F. L. Sweany.

My experience as owner of automobiles covers a period of five years, during which time I have owned and operated fifteen different machines, eight gasoline and seven steam.

I have given up steam altogether, and believe the gasoline engine the better for general all round use, both for business and pleasure. Although my experience began at a time when the automobile was a very crude product compared to what it is now, I have never once felt discouraged, and have always believed in the perfection of the auto, so that it will nearly if not entirely supplant the horse.

There is a great difference between the first automobile I bought and the present ones. Although my first one was very crudely constructed, I believe it was the first to ever make an overland trip from Indianapolis, Ind., to Chicago, and thence to Erie, Pa. It would have made the entire trip to Philadelphia had I been willing to wait ten days for the company to replace a broken shaft.

It has always been my aim to get all the service from an auto that I would require from horses, and I have certainly been successful. I do not now keep any horses, while I used to keep three and three carriages. Now I have two autos, and I am never without a carriage to step into either winter or summer, either for a business or pleasure trip. One can own two automobiles much more cheaply than he can a pair of horses and two or three carriages, and with two autos there will be no loss of time; much better time can be made both in winter and summer, and there is more pleasure in business trips and trips into the country.

Now that the manufacturers have the machine parts so far perfected that very little trouble will be met, with proper handling of the auto, it is surprising that not more attention is being paid to the tire question. However, I believe that that branch is just now eliciting much thought, and no doubt we will soon have tires that will give no trouble until worn out. And I know that every automobilist will gladly welcome the day.

I am also considerably surprised that makers of autos do not equip more carriages with enclosed tops for winter use, as my experience proves that this particular equipment is the source of the greatest comfort and satisfaction.

All know the delights of a run on a pleasant summer day, but few, I believe, have ever enjoyed the comfort, satisfaction and security which I derive from traveling around the city and into the country in my brougham top, which I had made three years ago to be put on in place of the summer top when cold and stormy weather begins. Nothing is more comfortable than to get into my brougham and light out down the slippery, icy streets, in snow storm or rain. No cover, rain coats, boots or curtains, etc., to bother; no horses and harness getting soaked and frozen when left standing. I can sit in my brougham and handle the levers just as easily as with the summer top on, and on the coldest day we have had here for three winters I have been able to ride around without even an overcoat and not feel cold, when riding without a closed top would have been hazardous and distressing.

I have never had any trouble with skidding. Any vehicle driven by the wheels is liable to skid more or less on slippery wet streets, especially the smooth asphalt streets, but this skidding can be nearly altogether obviated by careful handling of the levers. In my opinion there can be no remedy for skidding except carefulness on the part of the driver. As far as ice and snow are concerned, I want no better sport than to take my automobile out when the streets are covered with a sheet of ice, as was the case in Philadelphia a few weeks back, when hundreds were skating all over the streets, and the horse was completely out of business. Under such conditions I can get around over the streets with the same comfort and security as at any other time. In fact, there is no condition of weather in which my autos have not proven all that one could expect.

The water in my gasoline automobiles has never frozen to the extent of doing any damage, although I have left my carriage standing in snow for six hours during some of the coldest weather we have had in the past three years. In such cases I have been able to start without difficulty or delay.

I have never used any anti-freezing mixture, but for winter use I tack a piece of leather over the screen cover on the back of the carriage, which holds sufficient warmth to prevent the water from freezing. Of course this should be taken off in summer time.

The automobile is as far ahead of the horse for business and pleasure as the horse is ahead of the ox, and it will prove itself so to the whole world in the very near future.

The last vehicle, which I purchased about four months ago, has a double cylinder, two cycle engine, and I have been very favorably impressed with its beautiful running qualities, it being the first two cycle engine I ever owned. It is beyond question the simplest power generator I have ever seen for automobile propulsion. There are fewer parts by at least half than in any engine, either steam or gasoline, I have used, and after running four months there is not the least sign of wear or trouble of any kind; in fact, I have not had to touch the engine in any way, and it is my opinion that the two cycle engine will be adopted in preference to the four cycle when the manufacturers realize its great advantages.

The worst feature connected with automobiling at present is the unjust and class legislation that is being imposed by an ignorant and prejudiced public. Think of limiting automobiles in the city of Philadelphia to 7 miles an hour, street crossing, etc., to 5 miles, when horses are allowed to be driven all the way from 12 to 20. A man can walk five miles an hour easily; such nonsensical restrictions can result in nothing but abuse and persecution, for who, doctor or layman, will drive either a horse or any automobile as slowly as 7 miles an hour?

The automobile clubs should not only make themselves heard with regard to this question, but should make their influence felt.

Some Motor Cycle Suggestions.

By E. J. Valentine.

About a year ago I purchased a motorcycle, the motor of which was claimed to be 2 I. H. P. The motor formed a part of the seat post column, and the frame was very strongly built and had a double fork. When I set the machine in the rack, running the motor at about 1,200 revolutions per minute, it would travel all over the room and would shake the whole shop. The amount of noise that little machine could make was a caution. It had a float feed carburetor arranged in such a way that it would flood the engine when the rider started up hill. I therefore discarded the float feed and put on one of my own make, which gave the same mixture at all times.

The company had informed me that their motor was perfectly balanced and was very quiet when running at high speed, but the only time it was ever balanced was when it was lying quietly on my work bench; and as for noise, you could not hear yourself think when it was in motion, most of the racket being due to the peculiar valve motion. As for horse power, I think the B. H. P. of that motor was about one-half horse power when I first received it.

I took the motor apart and found the rings did not fit the grooves in the piston. I trued up the grooves and made new rings and ground them into the grooves; then put the piston into the cylinder and ground the rings to a good fit in the cylinder. The result was a good compression, and a motor that would climb a fairly steep hill.

I balanced the motor by drilling into the flywheels. Then I made a new vaporizer, with a throttle, the gasoline being regulated by a small needle valve—that is, the amount getting to the vaporizer. The air passed through a check valve which contained in its centre a small needle valve, having one sixty-fourth of an inch play, which allowed the main valve to lift slight-

ly before releasing the gasoline. I could control the motor very readily with the throttle, running it from 300 to 3,000 revolutions per minute, and it ran very nicely after being balanced.

The very best cylinder oil should be used in air cooled motors. The piston and cylinder walls will become very hot at times and a low grade of oil will burn up, failing to properly lubricate the cylinder. The motor should be run only a short time while on the rack, on account of the danger of overheating.

After making the changes I have named and putting on new wires with good connections the machine did very well. It was always ready to go and always brought me home again. Before the rider can expect to have any success with a motor cycle he must learn his machine thoroughly; he should be very careful to see that the batteries are properly packed in the box, so they will not short circuit. If a wire or any metal part of the battery comes in contact with the tin box in which they are carried you will have trouble. Sometimes a certain part of the battery will touch the box in such a way that you cannot shut off the spark at the grip.

Don't take your machine apart just to see how it is made; let well enough alone; oil it properly, give it the proper mixture, and it will run. Don't always be tinkering with it. Clean out the crank case once in a while by running kerosene through it. A very small quantity of Dixon's No. 635 graphite put in the cylinder will help out wonderfully. If the motor is stiff and hard put a few drops of kerosene in the cylinder on top of the piston; it will make it start better. Loosen the belt when the machine is idle. If your motor employs the splash system of lubricating the cylinder don't put too much oil in the crank case; if you do, it will get up in the cylinder and gum up the valves, get on the spark plug, short circuiting it and causing no end of trouble.

At one time a friend asked me to come over to his home, 18 miles distant, and see what was wrong with his machine. He had tried for a week to get it in motion and had failed. So one hot Sunday morning in July I got out my motorcycle and went over to help him out. His motor had no compression. I took it apart and found he had been using steam cylinder oil in it. I cleaned it all up, put in some oil and graphite I had with me, put the motor together again, and it ran as well as ever.

A young man came in one day and said his machine was no good; it would not run and he would sell it cheap. (He had been running a 25 horse power gas engine for a year.) I found his only trouble was that he had been tinkering with the spark plug and had gotten the spark points a little too far apart. On closing them up a little the machine ran all right.

The inlet and exhaust valves must be perfectly tight or the motor will not have much power. If they leak, grind them in with very fine emery and oil. Never use a file on the valves. Put the oil and emery on the valves and then turn it back and forth on its seat until it shows a bearing all around.

It is poor judgment to put a motor outfit on an ordinary bicycle; it might do for a while if used on fine roads, but sooner or later the front forks will collapse or the frame tubes will break off at the head. I never slow my machine down unless the roads are so rough that I cannot stay on it, and to ride a motorcycle that way the rider wants to know that he has a good frame under him.

Several years ago I went on a bicycle tour into Canada, and while riding along the St. Clair River, near the edge of the bank, on the finest road, I think, I ever saw, my fork stem broke short off, throwing me down the bank into the river. I walked back to Port Sarnia and crossed over to Port Huron, Mich., on the ferry. I found a blacksmith who let me braze the stem in his fire. I never get on a motorcycle now but I think of that wetting I got in the St. Clair River.

Don't try to build your own motorcycle, as it will be cheaper in the end to purchase a complete machine. There are some very good machines on the market now, and, whatever may be said against them, they are easy to operate, and they cost but little to keep n repair. It is a strange sensation at first to coast uphill and against a head wind, but I like nothing better than to sit in the saddle and listen to the steady pulsation of the little motor under me.

I used to take a good many trips on the old bicycle, and expect to do the same with the motorcycle.

A Gasoline Automobile the Carriage for Physicians.

By Dr. W. H. Sylvester.

In looking over the three varieties of automobiles to select one for my own use I soon decided on a gasoline carriage. My experience with an automobile has not been large and I make no claims of knowing much about carriages, except one type, the gasoline, and of these I know only the one I use. What little I do know has been learned by two seasons' experience.

The vehicle I used in 1901 proved to be too small for comfort and too noisy for village use. I soon became tired of hearing the complaints of its noise and of it frightening horses, and after a few weeks' use I sold it and waited patiently for my present automobile.

There are two classes of physicians who can use an automobile to much advantage. One class includes those who must keep several horses to do their work. An automobile will supplant all the horses a doctor has ever kept, for it will go at any time and all the time, and cover twice as many miles a day as all the horses he can use.

The second class includes those who have kept but one horse and wish to be able to get their work done quicker and use the remainder of their time in study, office work or recreation trips on the road. The physician who owns a good automobile will suddenly find his horizon much extended and the possibilities of his practice greatly increased, for he can take calls 15 or 20 miles away and not be absent from home longer than if they were much nearer, and he had to use a horse.

Having made the selection of your carriage, the question soon arises as to the care of the machine. In a few large towns and cities there are storage stations, but nearly all will have to provide a place at home, as livery stables almost universally refuse to take them, as it increases so much the rates of insurance.

CARE OF CARRIAGE.

As for myself, the question of the care of the carriage solved itself at once. I keep no man, and a carriage could not get the necessary care in a livery stable, even if they would receive it. So I must be my own driver, my own carriage cleaner and so far as possible my own machinist. This I could do better than most physicians, as I have a natural taste for machinery and a knowledge of repair work.

The physician who has neither time nor inclination for this must of necessity employ a man who is a good mechanic and can be trusted as one trusts himself. If he cannot find such a man he must not hesitate to don overalls and jumper and go over his automobile each day. If he does not wish to keep a man, and is not willing to do the work himself he had better rest contented with the horse for the present. This fact that I have cared for my own carriage probably to some degree accounts for the comparatively little trouble I have had with my automobile. By a careful daily inspection of all the parts of my machine I have been able to keep the nuts tight and all the parts in a good running condition.

For the information of prospective buyers who must care for their own carriage I will say that it will be necessary to spend at least half an hour a day in the cleaning and oiling and general looking over. One quarter of an hour a day will often be sufficient, but, of course, occasions will sometimes arise where considerable more time must be spent for unusual mishaps. For the everyday routine of taking care of an automobile I think half an hour a day is a fair estimate. Even if I have to spend one or two hours a day occasionally in mending tires, putting in new spokes or stopping leaks in gas or water tanks, I find my work is done so much easier that I do not get so weary as riding all day after a horse, and so much quicker that I find much more time for recreation and study than when I must depend on the horse.

In order to do my work quickly I do not find it necessary to exceed the legal speed

as a pace of 15 miles per hour will me over three times as many miles day as I need go for my business. les one cannot with comfort to him- nd safety to others go more than 12 miles an hour on our ordinary coun- oads. I am sure that a good gasoline ge will do the work of as many s as any physician can use, and with intelligent care, as regular as we give horses, it will not be laid up more in a season than a horse will average.

LIKELY TROUBLES.

w what troubles must a physician ex- who decides to use an automobile in- of a horse? The repair and replacing e tires will probably be the greatest se, and they certainly will be the est trial to his patience. My runa- has been used about 1,700 miles. rear tire has rim cut, so it would not the air, but it was repaired by the r at no expense to me except ex- The other one is far advanced on ame road, but it may last a few hun- miles more. The front tires are al- as good as ever.

have been told in these columns that en are born liars. Now since some nay wish to throw me into that class itate to say how little trouble I have with my runabout. After reading others have said I conclude that I about the best automobile made, for e had almost no trouble with it.

ring out two instances, both my own I have had nothing that could not ed in a moment on the road, and I think of but one time when I had t out to do anything while the car- was in use, and this was to tighten low speed, so it could start the motor ep sand.

THE IGNITION QUESTION.

ere is a liability of troubles with the on system, but these can be made few by an intelligent oversight. I had little trouble so far with my dry ries, and they have probably given ss bother and been a source of less se than a dynamo would have. The ge came with a set of dry batteries d up in a box. I got about 1,100 of service without a miss, till one when coming out after making a call, ld not start the carriage. Testing the I found it practically absent. Tak- he electric cars to the nearest bicycle I found a battery of four dry cells. out the old and slipped in the new and off we went as merrily as ever. after 600 miles of use the cells test mperes. This cost me $1 to replace. e I can run my carriage for this nt I shall not investigate the un- n merits of a dynamo. If I had been experienced I might have foreseen my batteries were about to run out, would have kept an extra set with me n emergency, for while I was always to start readily and there were no d explosions, there had been a loss of power for some time that I had not been able to explain, the cause of which would not be a mystery to me again.

WEAR INEVITABLE.

We cannot expect an automobile to last forever, nor can we expect that any combination of iron and steel can be made that will not break, nor will there ever be a carriage made that will not need intelligent care by some one of mechanical knowledge, at least sufficient to know when the mechanism is out of order. We must expect and be prepared to replace a definite amount of wear in every automobile of whatever make, as we expect to keep in repair our horse drawn vehicles. Tires will rim cut and puncture, and need to be replaced, and in time they will surely stretch out under the immense weight and strain that a motor of even a moderate speed is subjected to. Bearings will wear out, nuts will work loose and need constant watching, worn piston rings are sure in time to cause poor compression, and every part of the carriage will show a certain amount of wear each month we use it. The automobile is very far from being a perfect machine yet, although it is well advanced on the road to perfection, and I do not hesitate to advise any brother physician to get a good gasoline carriage and enjoy life as he goes along. The man who waits for a perfect automobile will still be waiting when some of us have worn out at least one carriage, and got our money's worth, too.

COLD WEATHER EXPERIENCE.

During the cold weather there are many days when the roads would permit us to use our automobiles, if it were not for the trouble of drawing off and adding the cooling water. If there were any safe substance that could be added to the water to prevent freezing, it would enable us to help out the horse many a day in the winter season. At the factory where my carriage was built it was suggested that chloride of calcium answered every purpose. I made up 4 gallons of the solution, 4 pounds to the gallon, and filled my tank with much confidence that it would remain fluid to 20° below zero. Three days after my engine began to snap and show signs of hard labor, and I soon found that drawing the plug did not stop the engine, but it continued to run for several minutes, igniting the charge from its own internal heat. After some study I located the trouble in the failure of the pump to work.

As I was near home, with the aid of a friend the vehicle was pushed to the stable, where I removed and dissected the pump. I found that the solution of chloride of calcium had penetrated the bearings of the pump, and, drying, had fixed it fast in one position, as if glued. Cleaning out the solution and washing the tank out with water I restored it to its old condition, and after a few days the engine ran about as well as ever. I have mentioned this experience of mine with an anti-freeze solution that others may be saved the same trouble, for I do not believe it will work where the pump is of the centrifugal variety. I shall experiment the next time with glycerine, but this is rather expensive; besides, I doubt whether it will radiate the heat nearly so effectively as where plain water is used.

So far an automobile has not proved a great expense to me. I am perfectly aware that my experience extends over too short a period to have my machine show great wear, but it is certain that 1,700 miles of use over all sorts of roads would at least develop radical faults if they were there. Perhaps another season I may have more trouble, but after making a careful study of my carriage inside and out I cannot see where there can be much expense for several seasons, aside from the tires.

THE MATTER OF EXPENSE.

The actual running expense of an automobile is very small compared with a horse. The amount I have paid out for running my carriage would hardly keep my horse shod for the same mileage.

In making expense comparisons people are apt to put the worst side of an automobile to the front for the reason that they are apt to begin its use with roseate ideas as to expense and durability, and when the inevitable troubles do come a natural disappointment follows that makes them remember all the expense and the difficulty they have had. Our horses we expect to get pneumonia and have their feet give out, and we know our carriages must have a definite amount spent upon them each year to keep them running, but from the talk of some people when they get an automobile they expect never again to draw on their pocketbooks for transportation.

To maintain my horse and carriages costs me one year after another about $10 a week. So far my automobile has cost me about 75 cents for gasoline and 10 cents for oil per 100 miles. I have paid out nothing for repairs so far. This does not represent what it would cost most doctors, as I care for my own carriage and can make all ordinary repairs. Besides I am only thirty minutes from the factory of the makers, who are perfectly upright in their dealings, giving you the benefit of the doubt every time when any question of responsibility comes up. I know there have been a number of times when I might have had a bill of expense if I had had some firms to deal with.

I do not believe a gasoline carriage is adapted for use in cold weather; that is, where the temperature is much below freezing. There are several difficult problems yet unsolved as to the use of an automobile in cold weather, such as condensation of the gasoline, making it impossible to ignite till the temperature is raised in some way. The water will need to be carefully removed each night unless one has a warm stable. The cylinder oil gets so stiff in a cold spell that it is well nigh impossible to turn the crank. Except in deep mud or snow one could get along slowly

by winding the hind wheels with ropes, but when we take all the difficulties into consideration I believe the physician in New England must have a horse for the winter. This has been my experience so far and that of all those I know who have an automobile.

PERFECTION NOT YET.

While I am an enthusiastic believer in automobiles, and feel sure that they are to be the horses of the future, I cannot allow that they have yet reached anything like perfection. The next ten years will see many changes, perhaps in directions that we cannot anticipate now. A few points seem to be settled; others are in a transition state, to be modified and changed for years to come. Manufacturers commenced at the wrong end, for almost universally have they been building too light, and now they must make their carriages heavier and increase the engine power to compensate for the added weight.

If I am ever so fortunate as to have another automobile there will be some changes that my short experience has found desirable. It will have a longer wheel base and standard tread. This will surely add to comfort, giving increased steadiness when going over rough places, and it will almost as surely necessitate stronger construction, for as you widen and lengthen your gear your centre of weight is brought further from the ends of the axles and there will be more wear and danger of breaking from increased leverage.

My next carriage will have artillery wheels, and I shall no longer have to deal with rusting and broken spokes. It will have much heavier axles. My Corning buggy, weighing about 400 pounds and designed to go 8 or 10 miles an hour, has the axles 1 inch in diameter, while my automobile, weighing 1,000 pounds and intended to go 20 miles an hour, has the rear axles 1 3-16 inches in diameter. It will have the gasoline and water tanks supported in such a way that they will not leak.

It will have the engine and transmission in such a position that they can be reached in case of need.

An Ideal Automobile.

By Dr. C. F. Howe.

An automobile to meet the requirements of the physician can be described in a very few words—viz., a machine with a motive power as convenient and simple in operation as electricity and as reliable as steam. This idea I derived from considerable experience with automobiles in my practice. The storage battery as a motive power is beautiful in theory and would be very practicable if it was not for the trouble of charging. The deficiency and inefficiency of power houses in the West must exclude electric automobiles.

Steam, on the other hand, is always a reliable motive power, and if a physician is himself a mechanic and an engineer, and has time to devote to it, a steam machine ought to suit; but for the physician with neither mechanical skill nor time I would advise something else.

Steam is now at the height of its perfection, while electricity and gasoline as motive powers are only in their beginning. In my opinion, gasoline as a motive power has the best and most certain future. In fact, gasoline automobiles compare well today with steam and are less dangerous, much less expensive to operate and less troublesome to keep in repair. Yet the gasoline machine has a few troublesome features of its own, with which I wish to deal.

I believe every automobile builder tries to make a good machine, but there are too many freak ideas worked in on the gasoline kind. Price cuts but little figure, as some of the lowest priced machines have simply fewer freak ideas. In fact, some of these lower priced machines would be very satisfactory were they not lacking in horse power for a rough country. The best way to select a machine is to try it, and the only other way is to subscribe for a reliable automobile journal and study well the records of all makes and buy none that has no record. Machines having no records are either very new in the field or not capable of making records. I have two machines and neither has records, for which there are good and sufficient reasons.

So far as wheels are concerned, automobile practice is the outgrowth of bicycle practice. The bicycle wheel was made small for convenience, but why should the automobile builder continue with the little troublesome pneumatic tired wheel, when the larger and easy running wheel would be better and cost less? I would prefer as large a wheel as convenience would allow, and with any other than a pneumatic tire. I have what is known as a fine fabric tire, which is probably just as expensive to manufacture as a coarser fabric, but the former furnishes more chance for exercise with the pump. After trying several excellent brands of cement, and the pump becoming defective from use, I filled one tire with cork dust, the kind California grapes are packed in, and another with a composition of glue and glycerine, and these two give me no further trouble from leaks or puncture. When the others become leaky they will also get glue and glycerine, or the cork dust. Any manufacturer wishing to adopt this method is welcome to do so.

Poor gasoline, a source of some annoyance, can be avoided, but the mixer or carburetor is likely not to work well in cold damp weather. Could not this trouble be overcome with a carburetor so constructed that the air could be heated before mixing with the gas, to dry out the moisture?

For ignition the dry battery gives good satisfaction. The transmission is probably the most frequent source of trouble. It is the real hoodoo to the success of the gasoline automobile.

The automobile is here to stay, and although I am having some trouble with my machines, I have no desire to go back to the horse. Like horse travel, automobile travel is more pleasant in good weather than in bad. There are good and reliable automobiles being made now, and a good and reliable machine would be beneficial in any physician's practice.

The Story of a Failure.

By W. J. Bartholomew, M. D.

Some time in 1888, while peddling pills over two or three counties of Western Nebraska, it occurred to me that it would be a very good thing indeed to have a motor different from the ordinary hay variety and one which would not get tired or colicky. A year or so of correspondence with various manufacturers of engines left me as wise as before, and correspondence with a firm of patent solicitors developed that most of the things I wanted to think original had already been patented. I nevertheless resolved to try and make a horseless vehicle. I bought a good stout solid steel shaft for a rear driving axle, various smaller ones for the sprocket wheels, and with the assistance of the town blacksmith set to work. A good stout two horse phaeton was decided upon as the proper chassis, and the engine, boiler and kerosene burner were ordered. The engine was, of course, to be marine; but the makers could not conceive the need of a marine engine in drought stricken Nebraska, so sent a stationary one instead. This mistake was readily corrected, and then ensued the fun of fitting the engine to the carriage. The little hand wheel on the propeller shaft was weighted with a couple of bands of heavy tire iron to give it a little more momentum. An oil tank was made, and a 10 gallon can served for the water supply.

The engine, which was supposed to be entirely automatic in action, developed sundry faults very similar to those of the present time. The fire would go out; the crosshead pump acted just as badly as some others; but the injector, after I had learned its vagaries, was a sure resource in case of low water.

The outfit was much too heavy for hill climbing, but developed excellent steaming properties with its porcupine boiler.

Well, to make the story short, the summer of 1890 was spent in experiment, only to ascertain that there was a serious lack of power. The rig would run after a fashion on level roads, but was not a success by any means, and the writer afterward put the engine to good use in a launch on the Brazos River, where it did its work very well indeed. It is now doing duty on Galveston Bay.

I am now looking for a steamer, and think them about O. K., so far as the present times indicate.

ıer's Experience in Buying, uilding and Running an Automobile.

By H. I. C.

ıg taken The Horseless Age for me, and being an officer in the Men's Christian Association, I deat it would be a good idea to leave r in the reading room after I had A few days after Dr. ——, who is t and also an officer of the asso- thanked me for leaving The ess Age on the Y. M. C. A. table ke of enjoying it. We began to different kinds of automobiles, and hat both of us had the "fever" at.

thought I would never be able to , as I had seen nothing I fancied than $1,000. One day the doctor d that we might own one in part- and after this we began to plan. locomotive engineer, I naturally steam at first, but after close inon I changed my mind.

ecided to go to St. Louis during il and look around. The doctor e day ahead and visited the differmobile stables and machine shops. m on the following day and found had plans mapped out for visiting aces together. And in the after- closed a contract to buy the parts soline automobile from a firm in y. The machinery began to come hirty days after the contract was rst, the running gear, then the end, last of all, the transmission, was not received until the last of

loctor being a dentist and naturled in mechanical operations, and perience I had in the use of tools ccupation, helped us in putting the ile together. We had a local naker build the body, the drawing rnished by the builder of the ma- We designed the levers and had pleasant controversies over this, as tor was accustomed to handling ools while I was accustomed to vers, such as are used in an engine d we were therefore both at ex- and generally agreed on a happy I worked on the machine my lay urs and the doctor at times he are from the office.

ıne 19 we started out with the au- and made a run of about two nd return, with very little annoyur transmission would not hold on gear, and we had to take it apart k about a day on it, on account of made at the factory. We stuck the first day, on account of the tank having no air inlet and the g to get into the carburetor. That edied by punching a small air hole crew cap. Neither one of us had len over three miles in an automo- had we inspected one more than what we could see the day we looked around St. Louis, when we purchased the machinery. We have had many "balks" (as we called them), but never yet have we failed to run it back home.

One evening the doctor and his wife were out riding when the hollow axle twisted off in the roller bearing. The automobile stopped, but the engine continued to run. The doctor told me afterward that if anyone had come up just then and offered to tell him how to run the machine home he would have given him $10. The idea came to him that by taking the differential apart, turning the long end of the cog wheels together, thereby locking them in the wheel on the solid axle, he could drive home by one wheel. (The solid axle runs through both wheels.) He was in the outskirts of our little city, and the customary number of onlookers were around with numberless suggestions. It took about thirty minutes to make this change, after which he ran home without any difficulty.

Our water tanks were in the sides of the body and were made with corrugated sides and with cooling tubes through them, but we devised a radiator, made of copper, which we placed in front and which helped very much in keeping the water cool. The circulation was effected by the water heating and rising.

In September we made a trip to St. Louis, which our odometer showed to be 78 miles going and 73 returning. Leaving home at 8:30 a. m. we made good time the first 16 miles, but the next 20 miles were full of perplexities, taking about four hours to run. The auto would stop and we took out the inlet valve, cleaned the carburetor and looked over every part, and did not have any satisfaction till we stopped at a little town to fill up with gasoline. Our radiator had sprung a leak, and while the doctor had a tinner solder it I took the carburetor apart and found it with the gasoline full of black dust. I then remembered that we had emptied our can when filling the tank that morning, and the dregs from it had gone into the tank and this dust was fine enough to work through the carburetor strainer and clog the tubes—it is a float feed. After this start we had one "balk," on account of not getting all the dirt out of the pipe. It was now 4 o'clock p. m. and 35 miles from St. Louis, and we had to go over rough, hilly roads, but we got to Eads Bridge about 7, crossed over into St. Louis and found a stable for the auto. We were enjoying supper at the hotel by 8 o'clock.

Next morning we called on the gentleman from whom we had bought the machinery. He had us run our auto to his shop and gave it a few touches that made the engine work much better and more powerfully, and to our pleasant surprise he would not allow us to pay anything, not even the livery barn for storage.

We started home the second day at 11 a. m., over rough Illinois roads. Made good time till within 10 miles of Carlyle, where a street fair was being held. Then we began to meet farmers going home with horses that had never met an automobile, and we often had to stop and sometimes lead the horses past the machine. After passing Carlyle, which is 16 miles from our home, our grief again commenced. It was getting dark and beginning to rain. Our radiator sprung a leak and before we knew it we were out of water and the engine began to pound. We stopped, fortunately within 200 yards of a house. After rousing the inmates we found their well and filled our tank with water. Then we started up, but the engine did not work good; it did not have power. The doctor got out, and watching, or rather listening to the engine, as it was very dark and our solar headlight was our only light, he discovered fire shooting out of the joint between the carburetor and inlet valve. It took only a few minutes to tighten up a bolt which had worked loose. After that our engine worked first class, but it was raining and the mud was getting deeper and the darkness increasing. But we kept working along until we came to a country store, where we expected to fill up with gasoline; but they had none. We were yet 10 miles from home. We then measured the gasoline and believed we could get home with what we had. After filling up with water we started. We were not very familiar with the roads and twice we turned at the wrong place, but fortunately into barnyards, and friendly farmers would come out and start us in the right direction.

Going over a clay hill, about 5 miles from where we had measured the gasoline, the engine stopped. We thought our gasoline was all gone, but found that the rain had moistened the wires around the spark coil and made a short circuit. We dried them off and after separating them some we moved along, a great part of the time on the slow gear. One of us would walk up the clay hills.

When we got to our home city limits the engine began to pound again, on account of the water having leaked out. But we kept moving. When we got onto the city streets it ran much easier and the air kept the engine from heating so much. We arrived at our barn at 10:30 p. m., covered with mud and every stitch of clothing upon us wet.

We are now rebuilding our machine, putting in a longer bed, lengthening the wheel base from 5 to 7 feet, taking out the side tube tanks and putting in one tank with circulating pump and tubular radiator. We expect to make another trip to St. Louis after the roads get good in the spring. We have enjoyed our automobile, especially the building, as it gave us new experience with tools, also in overcoming difficulties and in learning to manipulate the machine.

The manufacture of automobiles has been begun by the Standard Wheel Company at their works in Terre Haute, Ind.

..COMMUNICATIONS..

A Spark Coil Experience.

Editor Horseless Age:

Several weeks ago I had an experience which was entirely new to me and which I have never heard recounted or seen in print. For several days the motor had been slow in starting, requiring several turns to get the first explosion, but as my man does the cranking and had not complained I did not pay much attention to the trouble till it grew so bad as to be annoying on the road. In addition the engine developed the habit of stopping if throttled very low. I drove the wagon home and told my man to locate the loose wire and if there was none to examine the sparking points, as one of them might be loose.

He examined and tested all the wires, took out the sparking plug and examined all parts of the sparking outfit, but could find nothing wrong. Then I took the field and adjusted the sparking rod, cam and spark points till their action was perfect. Then I took out my inlet valve, put in a new spring and made all my adjustments perfect, but still the engine was very difficult to start, although when once started it ran finely. Then I went into the office and lay down to meditate (I can think to much better effect when lying flat on my back). After some two hours of careful consideration I concluded that the only possible source of trouble was the spark coil, although I could not understand how trouble in the coil could cause trouble in starting and not after the engine was in motion.

I put on my overalls and again repaired to the seat of war. This time I connected up the electric outfit of another wagon of similar construction to the refractory machine and lo! it started at once, and thanks to the care with which I had made my adjustments, ran as it never had run before. Next, while still in motion, I turned on the original battery and coil and cut out the electric outfit from the other wagon. The engine continued to run without a miss, but when stopped refused absolutely to start without the assistance of the electricity from the second wagon. I now took the coil from the second wagon and substituted it for that in the balky rig, with the result that it started at the first turn and has run admirably ever since.

I took the bad coil into my laboratory and proceeded at once to hold a "post-mortem." The only suggestion of trouble lay in the fact that one terminal wire came in contact with the ends of the bunch of wires forming the core of the coil. This contact was a very slight one and when the coil and terminals had been properly insulated I placed the coil in the wagon from which I had taken the other coil and it has done good service ever since.

Why this partial contact of one wire with the core of the coil should make it impossible to start the engine, and why after the engine was started it did not interfere with its running in any way, I can not understand and should be very glad to have some electrician explain to me.

Geo. P. Jesup.

The Item of Cost.

Boston, Mass., Jan. 26.

Editor Horseless Age:

The following figures may be of some slight interest. They represent the cost of maintaining a steam carriage, and cover a period of three seasons' moderate use, a total of 4,800 miles. (The carriage is one of the first steam carriages built, and weighs about 600 pounds with full tanks). It is now in first class order, though with the gloss gone from the paint, and the item of repairs is therefore complete to date. This is the account:

		Cents Per Mile.
Fuel	$59.45	1.29
Repairs	51.29	1.11
Tires	21.43	.47
Oil and minor supplies	4.61	.10
Total operating expense	$136.78	2.97

But for anything like a fair estimate of the cost of maintaining an automobile, certain other items should be included which do not usually appear on expense tables. For the case above they are as follows:

		Cents Per Mile.
Taxes on interest on investment	$93	2.02
Depreciation (owner's estimate)	250	5.43
Total charges to capital account	$343	7.45

The total cost of operating this carriage is thus 10.42 cents per mile, practically half of which is charged to depreciation. For the next few years at least, as in the past, I think the depreciation account will continue to figure more largely than any other for the automobile owner. The item of interest and taxes will, of course, diminish as the total mileage per year is increased, but in the table they have been computed at low rates, and for the average man, using his carriage for pleasure, they are not likely to be much smaller.

I cannot help thinking that the item of repairs is smaller than the average, judging from the accounts of users printed in your columns, and I attribute it to the fact that I have done my own repairing almost entirely, except on the engine, which has been cared for by the engine builders. A single experience (fortunately among the first) with a professional automobile repairer was quite enough to convince me that labor at 60 cents an hour was not necessarily competent, and the results of another visit to a different repair shop emphatically confirmed this opinion, bringing with it the con that a few more repairs similarly e meant destruction of the carriage.

The tires have exceeded the manu ers' expectation, probably because th lightly loaded.

Louis I

Electric Experience.

Salem, Mass., Januar

Editor Horseless Age:

A correspondent in a recent issue about experiences with electric car I have had one six months—time e to get an inkling of what is necess keep the machine in order, but of not long enough to find out how th tery will wear.

I first bought a runabout of st make, and then twenty-four cells tery. The cells would give about 1 miles an hour for the first 25 to 30 and then the speed dropped consid My longest run on one charge miles, but a good part of the distan in the country, where the roads wer and I also climbed a number of stee Judging from the current used arou city, I should say that I could miles with the same charge now.

I found that I must have an indep charging plant, as electric light com are giving up the direct current, and too much bother to run to a stati therefore bought a good sized gen and attached it to a 5 horse electric I had in my stable for running an el This has worked satisfactorily, al the cost for current is high. I shou that it amounted to about 5 cents A gas engine would reduce the e a great deal, I think, and I shall p in at once.

It does not require much work t after the batteries, yet they must be ined at least once a week, for the either slops out or is used up. Any takes two or three quarts about o ten days to keep the cells filled. not expensive, as I buy it all prepa a carboy, costing about 20 cents a I have found that the strength of th had a marked effect upon both the and mileage. To insure correct p tions I have bought a testing outfit, it is now possible for me to keep cells in normal condition.

It requires about four hours to the battery, using from 12 to 18 am I have tried a charge at a low amp say 10, and it took six or seven ho could not see that the machine did a ter than when it was charged in h time, while of course the cost was

Last week I examined several cells, unsealing the top and disconn them from the others. All the plate perfect, and there was no deposit bottom. Therefore, I conclude th plates have not suffered any fro months' use.

After I had used the carriage a I thought that I should like

the machine ran rather slowly on s. I therefore bought five extra ich fitted between the other trays With the twenty-nine cells I get a of 62 on a full charge, and the materially increased, especially on have not tried the mileage, al-he carriage has been run over 30 thout loss of power since the ls were put in. Usually the ma-charged after every run, so that gets entirely exhausted.

rouble with the extra battery is power seems too much for the y, as during a recent snowstorm gears were stripped while trying ut of a drift. This accident is the ible the electric machine has met l it was trifling compared to what carriages have.

rriage as originally fitted had a back, with upholstering hard as had a new seat with a top made, st of $65, and now the machine easily as a big carriage.

ectric has been used a great deal, trips, and on some 20 and 30 urneys. It has always started e handle was thrown over, and opped when on the road. So far I h pleased with its operation. It ole to stand hard work and ignor-dling in better shape than other for ladies have used it a great deal rked success. In fact the electric to be the ideal machine for femi-nds to use, and men are much with its appearance and operation. ective purchasers of automobiles like the way an electric carriage t they want one that has more mile-at feeling is well nigh general, and r getting an automobile there are v users who make a practice of ver 25 or 30 miles on a single trip it just for pleasure purposes. As a ink that my journeys are generally 5 miles, whether I use an electric line machine. When I first had a carriage I kept it pretty busy, just fun of riding, but now I can get fresh air I need in an hour or so—erefore long runs are infrequent. Sunday afternoon ride the electric as far as most people want to ride, aps twice the distance a pair of would be driven in warm weather. urse an electric machine is not in-for touring, or for runs of 50 to es. Personally, I do not believe it keep automobiles, especially for ips. In three years I have been on mile runs, and perhaps six of 100 I could have gone much easier on m cars, and probably I should use ans of conveyance in the future if I to travel such a long distance.

ecommending electric carriages so I do not intend to give the impres-at I should prefer one to a gaso-chine, if I could only have a sin-riage. Although I might never go in a gasoline machine a distance greater than an electric could perform, I should like to feel that I could travel any distance I want to cover if I felt disposed to keep on the road a week or two. Yet there are many people who will find the electric a reliable, pleasing machine. From my experience I think that the electric is at least no more expensive than other powers, and I am certain that it is easier to control, cleaner and less obnoxious to other folks than either gasoline or steam.

ROBIN DAMON.

Explosion Engine Queries.

BURTON-ON-TRENT, England, Jan. 4.

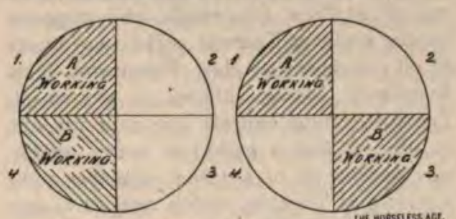
Editor HORSELESS AGE:

Will you kindly give your opinion why in four cycle, two cylinder, vertical internal combustion engines the usual practice is to set the cranks at 180 degrees? In this case the cycle of two revolutions will be as follows:

Cylinder A—(1) Working, (2) Exhausting, (3) Inspiring, (4) Compressing.

Cylinder B—(1) Exhausting, (2) Inspiring, (3) Compressing, (4) Working.

It is plain that with this arrangement the working strokes of the two cylinders follow each other in one revolution, which is



FIGS. 1 AND 2.

succeeded by another complete revolution without a working stroke. This may be shown in diagram form, as in the sketch, Fig. 1, above, which represents two revolutions of the crank. It has always seemed to me that a much more even torque would result from setting both pistons to work together, but adjusting valves and igniters so that one cylinder was working while the other one was inspiring, and exhausting while the other one was compressing. In this case the cycle of two revolutions would be as follows:

Cylinder A—(1) Working, (2) Exhausting, (3) Inspiring, (4) Compressing.

Cylinder (B)—(1) Inspiring, (2) Compressing, (3) Working, (4) Exhausting; and the diagram showing the impulses would be as shown in Fig. 2 above.

ARTHUR J. CLAY.

[The reason is that with the former arrangement there is a much better mechanical balance than with the latter, as one piston moves up while the other moves down, and the reciprocating parts are therefore balanced, except in so far as they are not moving in the same line, but are offset sideways. The advantage of better balance is considered to outweigh that of uniformly spaced explosions, with the resulting steadier torque, and the saving in flywheel weight required. We have seen engines otherwise identical, but one with a double throw crank set to 180 degrees, and the other with a single crank and adjusted to fire at equal intervals in the two cylinders, and found that there was much less vibration with the former arrangement.—ED.]

An Extensive Manufacturers' Test.

Editor HORSELESS AGE:

Dooley, the sage of Archey road, says: "There is no news in being good." For this reason an account of more than 2,000 miles traversed in twenty-eight days seems hardly worth writing. If the road, the scenery or the antics of the vehicle were of sufficient interest to be described the case would be difficult, but in this run—the longest usage the writer has yet given a single vehicle—there is but little to record. The vehicle was a stock three wheeler going through on a customer's order, and when we decided to drive it to Boston, accompanying the Reliability Run, it was hurriedly assembled, given a 35 mile test and a five day painting and upholstering, after which it started on its long trip without further test, the intent being to cover 1,000 miles before getting back to Reading.

The liking for new roads induced us to try another route to New York, taking advantage of the fine roads toward Philadelphia and beyond Trenton. We passed through Pottstown and Collegeville to Penn Square on the Germantown pike, where we turned squarely to the right about 2 miles to Centre Square on the Skippack pike, which we took toward Philadelphia, passing through Blue Bell, Broad Ax and White Marsh. Here we crossed a toll pike passing under a railroad bridge and through a toll gate, taking the first road to the left just beyond the gate. This is Church road, and with some windings leads along the township line through Ogontz, where it crosses the old New York post road. It leads direct into Cottman street, which crosses Frankford avenue just below Holmesburg, 60 miles from Reading.

We had covered this distance without a stop and had used the low gear but twice. Here a grinding in the front wheel indicated ball troubles, so we drove into a private lane and examined, finding a ball cone loose and the balls out of place. This was soon remedied and we drove into the centre of town, stopping at the hotel for dinner and water, and a call upon a friend. After two hours we headed toward Trenton, about 20 miles, passing through Bristol, and found 6 or 8 miles of sandy and somewhat rough road, which we passed over at a 12 mile an hour rate. We found our way through Trenton with but little inquiry, soon reaching Greenwood avenue, which leads into the road near the fair grounds, thence through Edinburg, Hightstown and New Brunswick, at which place we purchased gasoline because of its low price. We then drove to Metuchen, where

we took water from a handy horse trough, reaching Newark about 6 o'clock for supper, after which we drove leisurely in the dark to New York.

The next morning we saw the contest start and followed after, gradually overtaking and passing the various contestants. The front wheel cone had been carefully inspected and seemed all right, but after driving about an hour it loosened again, necessitating another stop for adjustment. The front wheel and support were removed from the vehicle, an easy matter, and the cone put back in place as firmly as possible. This required thirty-five minutes, but the job was well done and might not have given further trouble, as no subsequent loosening happened, but as a matter of precaution the wheel was again removed at Norwalk, the noon control, and several screws put in the hub in such a manner as to hold the cone firmly, since which time it had not been touched. In spite of this delay we arrived within the time limit, due to our ample power and speed capability.

On one hill we were hindered by several vehicles, some stopped and some moving slowly, and were obliged to take the low gear. During the remainder of the run we started each half day from ten minutes to an hour behind the leaders and usually arrived well to the front, if not leading. This not only enabled us to review the line twice daily and see what all the vehicles were doing, but caused us to drive at a higher rate of speed, necessitating very frequently driving over rough ground or in ditches to do this, which gave to our vehicle a much harder service than that experienced by the contestants. Several times we were given a brush by one of the other vehicles for a mile or two, which kept us moving lively. On one half day in particular we were chased almost the entire distance from control to control by various vehicles. We held our lead successfully in every instance but two, being beaten on the level by a red steamer and a large, high powered car of the French front type, both of which were followed toward the first rise, where we at once distanced them badly, a result made possible by the fact that while we had large power as compared to our weight, our vehicle was not fitted with spark advancer, and therefore not capable of as high speed as a steam motor or a gasoline vehicle, having four changes of speed forward.

At Boston after the contestants had gotten in three of us started for our hotel, when the chain was heard to slip over the sprocket teeth as if exceedingly loose. Not being willing to stop and investigate in the dark, as we should have done, we kept going, and after two or three warnings of this kind the chain finally ran off the sprocket. This compelled investigation, which was made, and showed that the cotter pin holding the distance rod was missing and the distance rod detached; so, although we were almost at our stopping place, we were obliged to replace the chain and cotter pin then and there. We assumed that the cotter pin had not been opened properly and the next one was put in more carefully. It was so short, however, as to make opening almost impossible, and after leaving Philadelphia on the return trip the same trouble happened, this time in the daylight, which made replacing an easy matter. After returning to Reading the cotter pin was replaced with a longer one, which prevented further trouble.

The motor being new and lubricated sparingly, caused the connecting rods to require adjustment, which was readily done by the use of a screwdriver and a pair of plyers in about two minutes. Two-thirds of a gallon of lubricating oil brought us back to New York city, 700 miles, but our can being empty at New Haven a quart was purchased there as a matter of precaution. We reached New York ahead of the contestants, brought a photographer to the finish, and then after the contestants had arrived took the passenger to the foot of Twenty-third street in time to catch his 5 o'clock train.

Some business was attended to next day and at 6 o'clock, another passenger having been secured, we started homeward, taking supper at Elizabeth, lubricating oil at New Brunswick, and stopping for the night at Trenton. The two quarts of oil purchased at New Haven and New Brunswick barely sufficed to get us to Trenton, being entirely too thin for our motor. A half a gallon of better quality was purchased of a steam engineer next morning at Trenton, which sufficed to get us to Philadelphia, where a further half gallon was secured, carrying us home nicely, at which place we arrived promptly at 6 o'clock on the evening of the tenth day, having covered 991 miles since leaving. Ten miles after supper finished the allotted thousand, and the vehicle was driven up Mt. Penn on the high gear next morning before returning to the factory as a test of its perfect condition.

Forty-four gallons of gasoline had been used on the trip, an average of more than 23 miles per gallon, while the difference in lubricating oils was very plainly shown by the fact that two-thirds of a gallon of one kind had sufficed for 750 miles, but a gallon and a half of thinner oils barely got us through one-third of that distance. We had no tire troubles whatever and no stops on the road, excepting the one mentioned for the ball cone and the missing cotter pin. Near Reading a team of mules jumped in front of us, necessitating a sudden application of the brake, which bent the distance rod, loosening the chain. We fixed this at once, although probably not of sufficient importance to have made it necessary.

The next three days the vehicle was driven another 100 miles, after which it was converted into a four wheeler equipped with 9 tooth sprocket instead of 11, and shipped to a city in Iowa, where, for fifteen days, it was driven stea demonstration work. Most of th over a short course of about 2 mi cluding railroad tracks, rough deep sand and the steepest hill av Choice of road was tendered each ger, and frequently exercised, so th as long as 25 miles were made whi in mud, ruts, creeks without bridg sand dunes without bottoms, all o obstacles were met without difficu leak in the water tank required sol and the flexible shaft driving the m broke on the road and required tw utes to replace. A pin in the mechanism broke, which prevent versing for the remainder of th about 25 miles. Next morning th transmission gear was removed fr vehicle in fifteen minutes without re coat and cuffs, a proof of accessil

Three dogs were run over, only which produced an appreciable de of the vehicle from its course. At th of the demonstration the vehicle w and delivered. The tires had been up and the sparkers set to fire a lit lier. Each morning the vehicle was over and oiled, after which nothing quired except sometimes filling with In one instance 107 miles had been without replenishing, the thermon 3 p. m. standng at 52°. No cleanin sulations or adjustment of sparke necessary in the entire 2,000 mil short, the entire run was almost A few misfires had occurred, but binding nut on the spark coil p accounted for these, as they stoppe this was tightened. The cost for was $1 at Norwalk, putting screws bearing cone, and 35 cents, so water tank. The tires had worn b and seemed good for at least ten ti distance. A loose nut on one of th holding the spring support to the c frame was replaced by a hardwa without charge.

The carriage seemed to be as ful as ever and capable of repeating nitely such work, although sever ordinary service.

The conversion of this vehicle three wheeler to a four wheeler ga to the impression that it has le which is simply another way of exp the fact that a three wheeler does less power and is therefore more than a four. CHARLES E. DU

Poisonous Effect of Exhaust

Editor HORSELESS AGE:

The story of Mr. Laflin's exp with gasoline vapor from his eng calls one of my own a year or so a relation of which might save som similar experience. I was running cylinder gasoline engine idle in t riage house, trying to locate a m trouble. The carriage doors were but the floor is not tight and has

lerneath, and the side door and a indow were open. I was thoraware of the possible effect of the thought it resembled that of comminating gas in that a person was e to evil effects if he felt all right a reasonable amount of pure air. s have taken the precaution on ccasions to frequently go to the d get several full breaths of good is time I worked off and on about iour and then took my bicycle and or the store. I felt a trifle light rted, but the cool air of my quarride made me apparently all right ntered the store evidently as well I walked in to the back, was struck d fell in a chair in a faint. It took utes or so to bring me to, and r so more before I could stand. as able I went home, took a th and rub down and some sweatk and went to bed, slept several nd woke up passably. It was at days before I felt really all right. since I have felt the same effect in vhat similar trial, but avoided my perience. I had always supposed gas would overcome as common ting gas does, and that the victim asily recover by plenty of pure air, experience causes me to believe gasoline article is a poison that the system is not so easily gotten In trying out these engines, parin cases of misfiring, look out for on of the room and don't breathe as any more than necessary.

W. E. SMITH.

Gasoline Motor Data.

Horseless Age:

t me to enter a protest against ure of the Show reports, not only excellent publication but in others, ormal motor speed." When autowere simply stationary engines d on a set of cycle or buggy each engine had a governor which speed, while its power was probbted as delivered at this speed, but nditions are different. The univerof throttle control (we haven't governor motor for seven years) e away with such a thing as "northor speed," and motors now run eir minimum to their maximum while they are rated as to their ower, presumably at the speed hey will deliver their greatest but since the average automobile loes not deliver its greatest power ten in actual work, the average hich might be assumed to be its speed is considerably below the hich gives maximum power and far below maximum speed. facts are known by the experts pare the reports, and the quicker tional way of imparting informaadopted the better for both the turers and their customers, the people who wish information. The incorrectness and injustice of these reports are shown by one which stated that our motor runs at a normal speed of 1,000 revolutions per minute, when as a matter of fact at 12 miles an hour (probably a high average speed for a vehicle in daily use) the motor is running considerably less than 500. So long as manufacturers desire to state the maximum power that their motors will give, nothing better seems available than to state in connection with this power the number of revolutions per minute at which this power is developed, and this is what should be given instead of the "normal" revolutions so called, for one is an entirely different thing from the other. Care should be taken to distinguish the revolutions for maximum power and the revolutions for maximum speed, for most motors will not give their maximum power and their maximum speed.

Some standard classification should be adopted that will enable buyers to distinguish more clearly between high speed and low speed motors, and actual and promised horse power. Just to curiosity a table of comparative motor sizes has been prepared, giving the bore, stroke, horse power and revolutions per minute as stated in your issue of January 21. From these figures the piston displacement in cubic inches has been figured and this I regard as a much more reliable measure of horse power than the figures usually given. Gasoline and air are substantial and known qualities, and the motor vehicle engine is no longer a mysterious or secret device, so no reason seems to exist why one maker cannot secure from a cubic inch of properly mixed air and vapor the same energy that another maker secures. Assuming this to be true, the piston displacement becomes a very correct indication of the power that may be expected from a given motor. Of course, this is modified by the engine speeds. Since a high speed engine cannot be expected to wear as long as a low speed one, the gain in power is naturally offset by the loss in length of life and increased repairs. The speed of an engine, however, should be stated in piston speeds rather than in revolutions per minute, for this is the point of greatest friction and therefore most affected by excessive speeds. Since, however, it is rather a complicated job for the ordinary inquirer to get at piston speeds, it would seem that piston displacement, crank shaft revolutions and the ratio of gearing between the motor and the rear axle with the size of the rear wheels are probably points of greatest interest. In connection with the disappearance of "normal motor speed" goes, likewise, the stating of gear ratios in miles per hour, for if there is no "normal motor speed" there can be no expression in miles per hour of the different ratios of gearing connecting the motor and the rear axle, and this should be expressed in terms of revolutions of the crank shaft to rear axle revolutions.

The table given contains a column of the revolutions stated as normal and an-

Bore.	Stroke.	Volume displaced by piston, cubic inches.	Claimed h. p. for each cylinder.	Normal speed.	Revs. to give 750 ft. per minute piston speed.	Half piston displacement at 750 ft. per minute.
3⅛	3½	27	3	....	1,280	17,280
3¾	4	44	5	1,200	1,125	24,550
3¾	4¼	46½	4¼	1,200	1,060	24,600
3⅞	4	47	6¼	800	1,125	26,500
4	4¾	59½	6	1,400	950	28,250
4	5	62¾	4	900	900	28,200
4⅜	4⅜	65¾	5	1,000	1,025	31,600
4	5½	69	4	....	830	28,600
4½	4½	71¼	3⅓	700	1,000	35,600
4½	4½	71¼	6	800	1,000	35,600
4½	4½	71¼	6	..	1,000	35,600
4¼	5¼	74½	6	900	855	31,750
4⅜	5	75	4	900	900	33,750
4	6	75½	6	900	750	28,250
4½	5	79¼	5	....	900	35,650
4½	5	79¼	5	700	900	35,650
4½	5	79¼	5	.	900	35,650
4¾	4½	79½	3½	600	1,000	39,750
5	4½	88½	12½	1,900	1,000	44,250
5	5	98	6	850	900	44,000
4¾	6	106	6	1,000	750	39,550
5	6	118	6	600	750	44,250
5	6	118	6	....	750	44,250
5	6	118	6¼	....	750	44,250
5	6	118	7	700	750	44,250
5	6	118	7½	750	750	44,250
5	6	118	7½	800	750	44,250
5	8	153½	8	600	560	43,000
6	6½	182	12	850	690	62,800

other column of the horse power claimed. To give a better idea as to whether these motors are high or low speed, and whether horse power claimed can be maintained in actual service, the piston strokes have been reduced to feet per minute, and a column is given showing the number of revolutions permissible to produce a piston speed of 750 feet per minute, which is believed to be a safe speed. From this it will be seen that some motors are run faster, others slower. Some are rated apparently too high and some apparently too low. While I do not wish to insinuate that the horse powers stated are either too high or too low, if buying a vehicle I should give preference to the one having large cylinder piston displacement and lower piston speed than that theoretically allowed. This table gives single cylinders only, the stated power for multiple cylinder being divided by the number of cylinders so as to secure the power per single cylinder.

CHAS. E. DURYEA.

Gearing Queries.

Editor Horseless Age:

Will you kindly furnish us the following information: In a 10 horse power automobile with 30 inch wheels, geared to run at a maximum speed of 25 miles per hour, how much would the power be reduced if 36 inch wheels were substituted and the gearing changed so as to make the maximum speed about 15 miles per hour? Would this reduction in gear balance the increase in the diameter of the wheels? Do you think that 10 horse power would

carry four people over a 25 per cent. grade, the vehicle being equipped with 36 miles per hour? BELLOS BROTHERS.

[In order that the vehicle may retain the same hill climbing power when the diameter of the wheels is increased it is only necessary to change the gear in the same proportion as the diameter of the wheels, which would leave the miles per hour the same. For instance, if the large sprocket is changed only, its number of teeth should be increased in the same ratio as the diameter of the wheels—that is, in the ratio of 30:36 in this particular case. We cannot say whether 10 horse power would be sufficient for the purpose you mention, as it would depend upon the efficiency of the transmission gear, the weight of the carriage and other factors of which we have no knowledge.—ED.].

Motor Traction on Slippery Asphalt

NEW YORK, January 27, 1903.

Editor HORSELESS AGE:

Although the automobile cannot climb fences to circumnavigate snow drifts on country roads, as one of the contributors in your recent Doctors' Number states, yet a very striking instance of the auto's superiority under severe traffic conditions was observable on Monday, January 26, after Sunday's severe snow storm.

New York asphalt streets were very slippery, and it was pitiful to note the painful attempts of the horses to obtain a foothold on the icy surface while the motor propelled vehicles rolled right on by without any trouble whatever. The heavy electric carriages were particularly successful owing to better wheel traction, due to their weight. J. G. PERRIN.

A Report Corrected.

CLEVELAND, Ohio, January 27.

Editor HORSELESS AGE:

Enclosed you will find clipping which appeared in your issue of January 16: The only reason the writer can see for this Mr. Bilz giving out such a statement is to create a wrong impression of the writer and advance his own personal interests thereby.

I sold out my business at Denver to this Mr. Bilz, making a clean bill of sale. I have nothing there, nor have I had anything there since this sale, to be put in the hands of an attorney, as he makes mention of; he and I were partners for probably six months prior to my making him a give or take offer; he accepted the proposition and bought me out. Afterwards I took a road position with a prominent automobile manufacturer, and, knowing it is not your intention to misquote anyone, would ask you to kindly correct this statement. WEBB JAY.

Motoring Illustrated has addressed an appeal to King Edward to allow the Gordon Bennett Cup Race to be run in England.

BEGINNERS PAGE.

Elementary Notions About Electricity and Electric Vehicles.

The satisfactory operation of an electric carriage depends to a lesser degree upon thorough familiarity of the operator with the details of construction of his machine and its modus operandi than that of vehicles with other forms of motive power. Annoyances from little troubles on the road are less frequent than with vehicles with the other motive powers, and in case of something serious happening the operator's familiarity with the machine would seldom enable him to correct the trouble. Nevertheless, we believe, operators of electrics, too, prefer to understand their motive power as thoroughly as possible, as it adds to the pleasure of operating and enables them to better care for their vehicles.

Electricity is a form of energy, the same as heat, which latter is the propulsive agent in steam and gasoline vehicles. One difference between these two forms of energy is that heat can be obtained directly from fuels found in nature, by the process of natural combustion, while electricity for practical purposes can only be obtained indirectly by first transforming the potential energy of fuel into heat, the heat into mechanical energy (in a heat motor) and the mechanical energy into electricity. For this reason heat motors, such as steam and gasoline engines, are called prime movers, while electric motors are called secondary movers.

Two kinds of electricity are mentioned in physical treatises, static electricity and current electricity. Only the latter kind concerns us, however, as it is the only one that finds application in electric automobiles.

CONDUCTORS AND NON-CONDUCTORS.

It is very convenient to regard electricity as a fluid which will "flow" through or be conducted more or less readily by certain substances, particularly metals, and which will be retained or insulated by other substances, such as glass, rubber, etc. Materials which allow electricity to flow through them are called conductors and those which obstruct the flow are called insulators. Insulators are in reality extremely poor conductors, as even the best insulators conduct current to some slight extent. The best conductor among commercially practicable materials is copper, which is at present almost exclusively used for the conduction of electricity when any considerable amount of energy is involved. Wires of other metals, such as iron or brass, are suitable for transmitting small currents.

ELECTRO-MOTIVE FORCE.

A flow of water between two p always due to a difference in l tween these points, water pro always flowing down hill. A flow tricity is similarly caused by a fa ferred to as a difference of electri tial. It should be remarked here electric current can only flow in plete circuit of conductors, so there is a break in the circuit son the current flow is interrupted. ference of electric potential is est by the source of electricity a pends entirely upon that source. is a difference of electric poten tween any two points in an electri when a current is flowing. The d of potential for the entire is called the electro-motive force source of current and is measured

CURRENT STRENGTH.

Another factor in our hydraulic is the rate at which water flows p given point along its path. Th sponding factor in electric pheno the rate at which electricity passes the conductor, which is called the and is measured in amperes. In of a current of water between a points the amount of water flowi any given point in unit time—i words, the rate of flow—depends fi the difference of level between t points, being greater in proportio difference of level; then upon th distance between the two points, ing as this distance increases; an upon the cross section and surfac bed of the channel through whi water flows. Similarly it has bee that the flow of electricity in a co between any two points depends upon the difference of electric p between these two points (which expressed in volts); then upon tance apart of the two points, m along the path of flow, and final the cross section and the materia conductor. For a given condu length, cross section and material course, fixed and their collective upon current flow may be expre a single term, which is called th ance of the conductor. It is a mental law of electrical phenome the strength of current flow is proportional to the electro-motiv active in the circuit and inverse portional to the resistance. This called Ohm's Law, and is usua pressed in the following form: The motive force divided by the resis equal to the current. The unit o ance is called the ohm and the sa may also be expressed as follows: ohms = amperes.

GENERATORS OF ELECTRICITY

There are two methods in gen for the generation of electric curr chemical and mechanical. Chemi

erators of electricity are called batteries, and mechanical generators are termed dynamos or magnetos. Batteries are divided into primary and secondary batteries. A primary battery is a battery in which the active chemical materials are renewed after the chemical process resulting in the generation of an electric current has been completed and a certain amount of electricity has been drawn from the battery. A secondary or storage battery (also called an accumulator) is a battery in which the active chemical materials after the chemical process which results in the generation of the electric current has been completed are restored to their original state by a current from some external source being sent into the battery. Only secondary batteries are employed in electric automobiles.

A battery is composed of a number of units called cells or elements.

PARTS OF AN ELECTRIC VEHICLE.

The power equipment of an electric vehicle consists essentially of a battery of storage cells or a storage battery, one or two electric motors which are driven by current from the storage battery, and a controller by means of which various alterations can be made in the electrical connections affecting the speed and power of the motors. The battery cells are usually arranged in two, three or four wooden trays, for convenience in removing them from the vehicle. The usual location of the battery is under the seat of the vehicle, but in some of the latest models a part of the battery is placed in front under a hood, and in some vehicles the battery is placed in a box below the body.

The motors in the majority of cases are supported on the rear axle and are geared directly by spur gears to the rear axle or wheels, according to whether one or two motors are used. A number of recent designs have the motor hung from the body and gear by chain to the rear axle. The controller is invariably placed under the seat of the vehicle.

The Boston Show.

The following list of exhibitors at the Boston Show has been furnished us by the management. It includes the names of a number of members of the N. A. A. M., but we assume that the Boston or New England branches of these manufacturers are meant: International Motor Car Company, George H. Lowe, Harry Fosdick, A. J. Coburn, Columbus Automobile Exchange, Automobile Headquarters, Automobile Exchange, Pope-Robinson, C. I. Campbell, Stanley Steam Carriage Company, Long Distance Automobile Company, Bates Brothers, A. T. Fuller, H. Marvin, Kenneth A. Skinner, E. E. Randall, Reed & Underhill, American Motor Vehicle Company, H. B. Shattuck & Son.

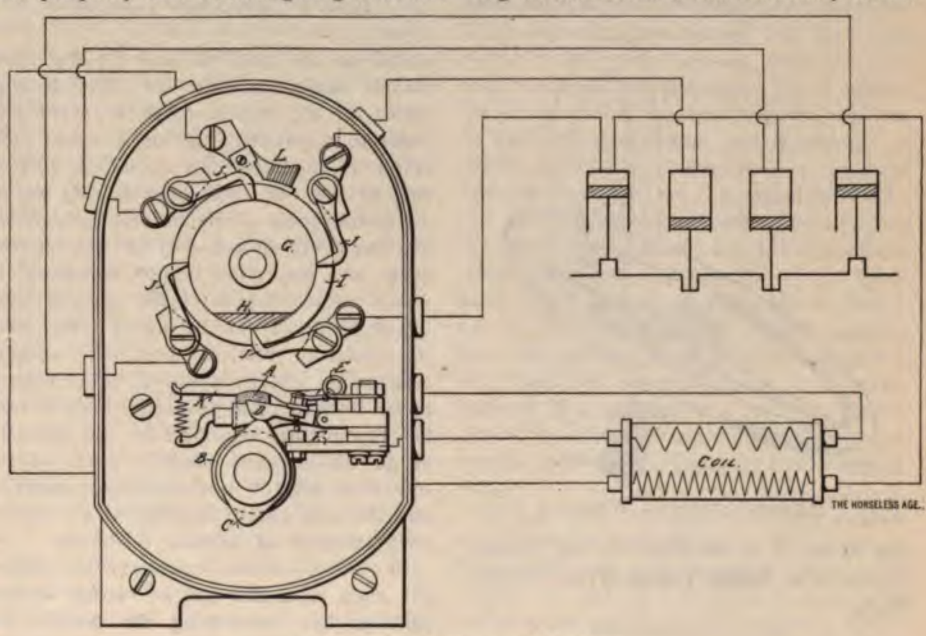
NEW VEHICLES AND PARTS.

The Eisemann Igniter.

A magneto generator for gasoline engine ignition containing within its enclosing casing the interrupter and a commutator for distributing the current to either two or four cylinders was first shown to the American automobile public at the recent Madison Square Garden Show. It is of German manufacture and is marketed in this country by Alfred Vischer & Co., 43 West Fourth street.

The machine is constructed with three double permanent field magnets of tungsten steel heavily painted and produces an alternating current—one impulse for every spark to be produced in the engine. The magneto is driven either directly or by positive gearing from the engine crank shaft. The current is collected by means of a coppered carbon brush A bearing on the periphery of a collecting ring B at one end of the armature. Just outside this ring upon the armature shaft is fastened a double cam C upon which bears an arm D held in contact with it by a coiled spring E. This brush is provided with a contact point adapted to make contact with another point, at the end of an insulated bracket F. The contact point on the arm operated by the cam is in electric connection with the brush collecting the current from the armature.

The commutator wheel G by which the current is distributed to the various cylinders is located directly above the armature and is driven from the armature shaft through gearing at a two to one reduction—that is to say, the commutator wheel turns once for every two revolutions of the armature. The commutator wheel is composed of insulating material and is provided with a metallic segment H in electrical connection with a metallic disk I located adjacent to it. Upon the periphery of the commutator disk there are four contact brushes, J J J J, each of which is electrically connected to the spark plug of one of the cylinders. A brush L connected to the secondary of the spark coil bears on the periphery of the metallic disk I. A single coil is used, as indicated in the illustration. In the illustration the various parts are shown in such a position that a spark has just been produced in the cylinder on the left. The circuit breaker arm has been raised by the cam and the segment on the commutator is at the moment under the brush connecting to the spark plug of the cylinder farthest to the left. It will be understood that one terminal of the armature winding is grounded, as well as one terminal of the primary winding of the coil. The other terminal of the primary winding is connected to the stationary contact



Eisemann Ignition Apparatus.

point of the interrupter. Two impulses of current are produced during each revolution of the armature, and the circuit through the armature and the primary coil is broken twice in each revolution, there being a double cam to the circuit breaker. Every time the circuit is broken the segment on the commutator disk is under one of the set of four brushes, which successively connects the secondary winding of the coil to the four spark plugs respectively.

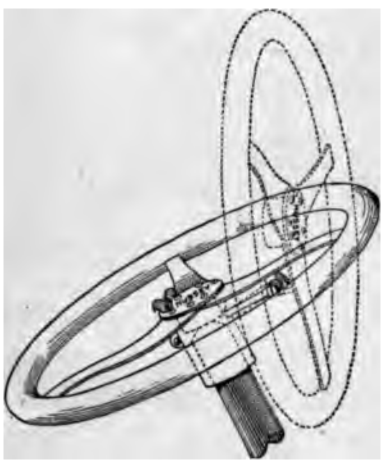
The armature is wound to be highly self inductive and to give a low voltage and strong current. The engine can be started without the use of a battery. The brush holder is of such design that the carbon brush can be removed very readily by simply raising the lever K.

The coil is of the cylindrical or round

type, enclosed in a hard rubber case and practically waterproof. The weight of the device is 30 pounds inclusive of the coil, the latter weighing 5 pounds. For make and break ignition the coil is not needed. The magneto is made in different forms suitable for four, two or single cylinder engines, that for the latter type of engine being particularly intended for cycle engines.

Hussey's Tipping Steering Wheel.

We illustrate herewith a steering wheel which can be swung back around a pivot on the steering post column to permit free ingress to the carriage. The wheel is pivoted on a bracket extending forward from the column and at right angles thereto, and is held in position centrally at the end of the steering post by means of a thumbscrew and hinged bolt. This wheel was seen fitted to many of the vehicles exhibited at the recent Madison Square Garden Show; it is marketed by the Hussey Automobile Supply Company, of Detroit, Mich.

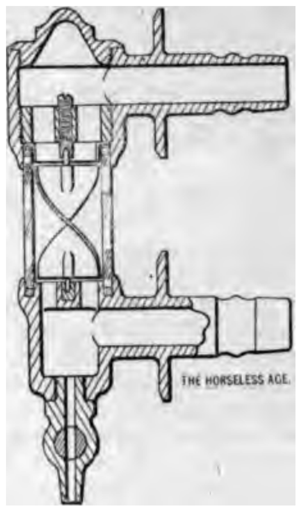


Hussey Steering Wheel.

King's Fluid Motion Indicator.

The device described in the following is intended to provide means for immediately ascertaining the condition of water circulation on a gasoline automobile, i. e., whether the mechanism employed for causing the water to circulate is in perfect working order. The indicator also enables the operator to ascertain the relative state of purity of the fluid moving through it, a transparent member being provided for this purpose. The device further serves to remove some of the impurities that may get into the water circulating system. To this end the lower head of the circulation indicator is provided with a pocket into which any impurities finding their way into the device will settle, and from which they can be drawn by means of a drain cock.

The fluid moving through the indicator impinges against a vane revolving upon two spindles. The adjustment of the spindle bearings is said to be accurate enough to indicate even the slightest motion of the fluid. The vane is always in plain view and its motion is propor-



King's Circulation Indicator.

tional to the rate of flow of the fluid. Should the circulation of the cooling water for any reason cease, the vane will come to a standstill, giving a visual indication of the fact. An occasional inspection of the vane will thus quickly reveal the effectiveness of the circulating mechanism and avoid all necessity of opening stop cocks and inspecting pumps or piping, to verify the circulation of the cooling fluid.

The indicator can be placed either in a horizontal or vertical position, without altering its effectiveness. It is, of course, to be located in a position where it may be conveniently observed by the operator at all times. The metallic parts of the indicator are of non-corrosive material, and the transparent member is an annealed glass tube of suitable thickness.

Should it become necessary to replace the glass tube, this can be readily accomplished by unscrewing the plug in the upper head of the device. Means are provided for taking up wear of the spindles and for properly adjusting the bearings. The indicator is inserted in the circulating system by means of rubber hose connections or metallic piping. It is claimed to be immaterial into which opening of the indicator the fluid enters and through which it leaves. To make the revolving motion of the vane more discernible portions of the latter are tinted in strongly contrasting colors.

The device is manufactured by A. W. King, M. E., Maywood-Hackensack, N. J.

His Voice Unsteady.

A.—I heard that you were to give a lecture on storage batteries last night at the automobile club; did you do it?

B.—No, it got too late; it was nearly 11 o'clock when my turn came.

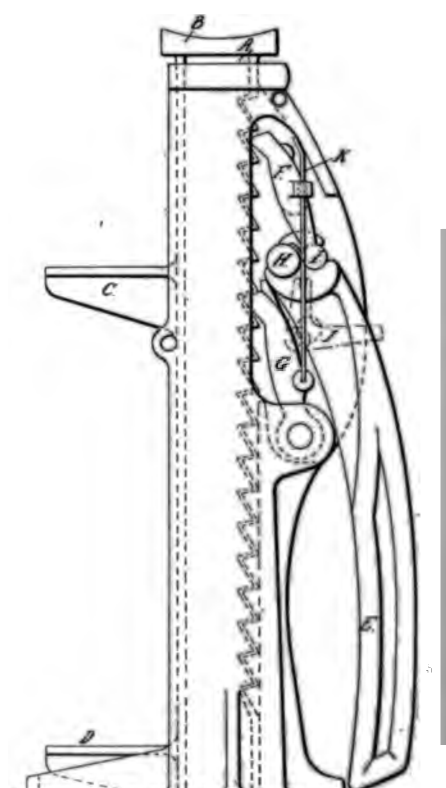
A—That was, of course, rather late.

B—Yes, I couldn't pronounce "accumulatoren" any more.—*Fliegende Blätter*.

Holahan's Lifting Jack.

The Krackerjack Manufacturing Company, of which W. H. Flaherty, 20 Broad street, New York, is the sales agent, is now placing an automobile jack on the market which it has named the "Krackerjack." The accompanying cut illustrates this jack, which has a maximum capacity of 1 ton.

The rack bar A, with numerous teeth, a plate, B, and two ears, C and D, is located in a hollow standard and is operated by the lever F, and the pawls F and G. The latter is virtually a latch and does not lift the rack. When E is raised the pawl F engages with a tooth and raises the rack until the lower pawl catches a tooth and prevents the rack from assuming its former position. The lever E being fulcrumed at H, and F being pivoted at I to the lever, the pawl must move down with the hand lever and ultimately engage with the next tooth. The same operation is performed as soon as E is raised. To lower the axle, which the jack is suspending, a small bell crank J of sheet metal (shown in dash dotted lines in the cut, because it is attached to a lid which was removed to expose the mechanism) is provided, which engages with a piece of spring steel wire K that passes through bosses of the pawls. This wire is bent back by pushing the bell crank down until it catches, and the pawl F engages with the tooth just above the one with which it would engage were the bell crank in the position in which it permits the mechanism to raise the pawls. In the drawing all the working parts are shown ready to



Holahan's Lifting Jack.

e rack. The specifications of the
:

Height. Bar Down. (In.)	Rise of Bar. (In.)	Height. Bar Raised. (In.)	Size of Bar. (In.)	Weight. Pounds.
12	6	18	1¼x⅞	7

ack is small enough to raise the
deflated 26 inch wheels.

e Columbus Motor Truck.

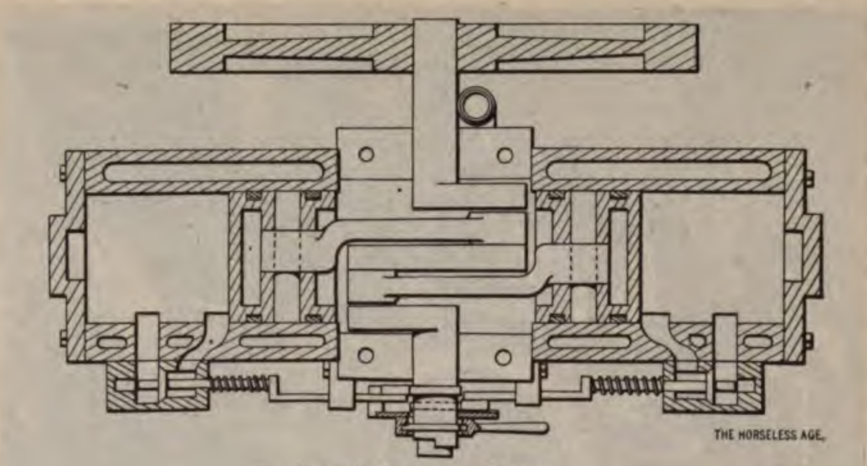
soline motor driven truck has re-
peen completed by the Columbus
Truck and Vehicle Company, of
us, Ohio. A photo of this machine
n herewith. It has a stake body
ighs complete 3,800 pounds. The
ase is 90 inches and the tread 67
the front wheels are 33 inches in
r and the rear wheels 37 inches,
are equipped with 3½ inch solid
tires. The axles are supported on
earings.

notor power is furnished by a single
, horizontal gasoline engine rated
orse power. The bore and stroke
ngine are 6½ and 8 inches respec-
nd the normal engine speed is 400
ons per minute. The cylinder is
ed by gravity feed and the igni-
by make and break spark, which is
with current by a battery in start-
by a generator in normal opera-
The time of ignition is controlled
by means of a lever; the gaso-
ed to the mixer by a gasoline pump
erflow so arranged as to maintain
nt level.

transmission is effected by means
ecial form of belt running on ex-
pulleys, which admits of a con-
variation of speed between the two
s, 1½ and 15 miles per hour. The
the rear axle is by separate side

water tank capacity is about 9 gal-
d the water is circulated by means
ar pump attached to the lateral
f the engine. The gasoline tank
gallons. The vehicle is equipped
el steering. The machinery is sup-
by an angle iron frame, which in
supported by the sills and the
bars. The arrangement of the
ssion permits of using the reverse
ism for breaking purposes without
ger of stripping the gears or caus-
er trouble, but this expedient is not
ry except in special cases, as the ve-
said to be equipped with very effi-
nd brakes acting on drums of large
r fastened directly to the rear

company builds vehicles for deliv-
light freight work and for heavy
er service, in different sizes, and the
vehicles with both stake and plain
body.



Toedt's Gasoline Engine.

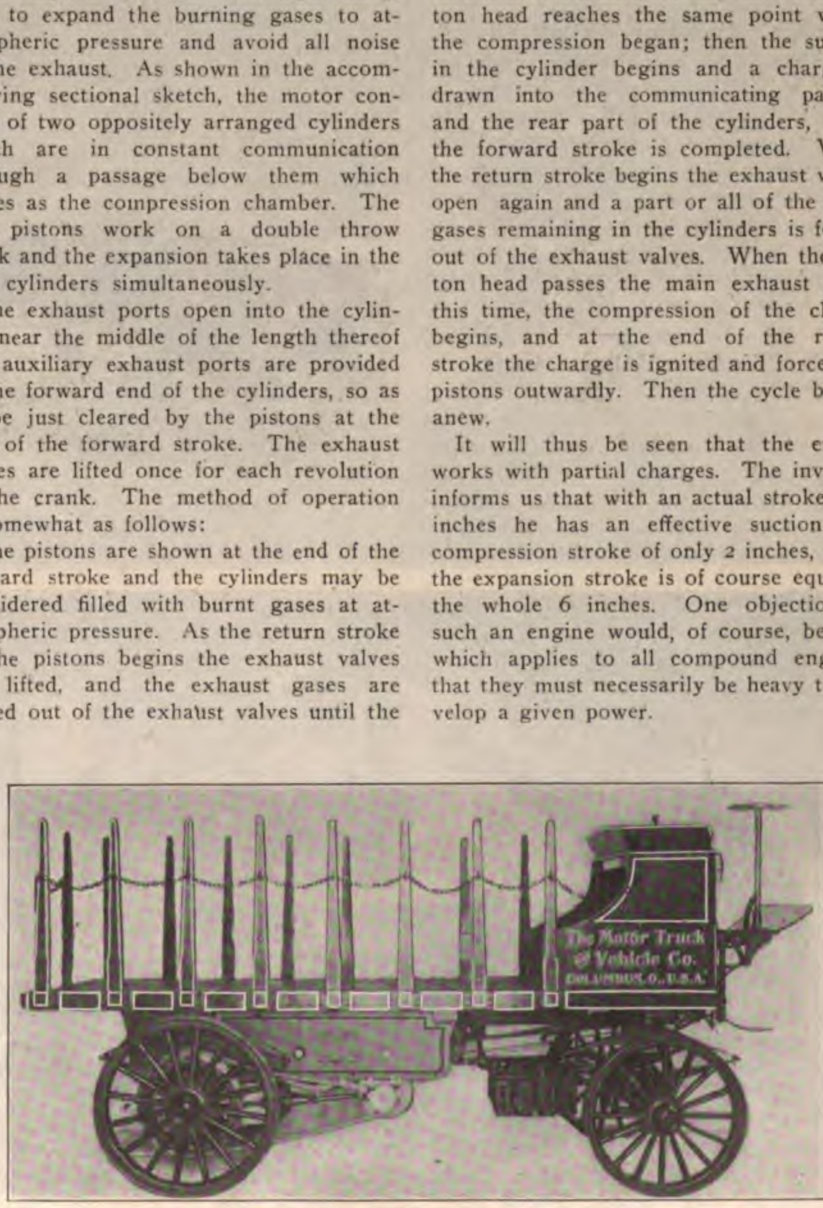
The Toedt Gasoline Engine.

Frederick W. Toedt, of Hamburg, Ia., has invented and built a gasoline engine with which he expects to accomplish the same object which it is sometimes sought to accomplish by means of compounding, viz., to expand the burning gases to atmospheric pressure and avoid all noise of the exhaust. As shown in the accompanying sectional sketch, the motor consists of two oppositely arranged cylinders which are in constant communication through a passage below them which serves as the compression chamber. The two pistons work on a double throw crank and the expansion takes place in the two cylinders simultaneously.

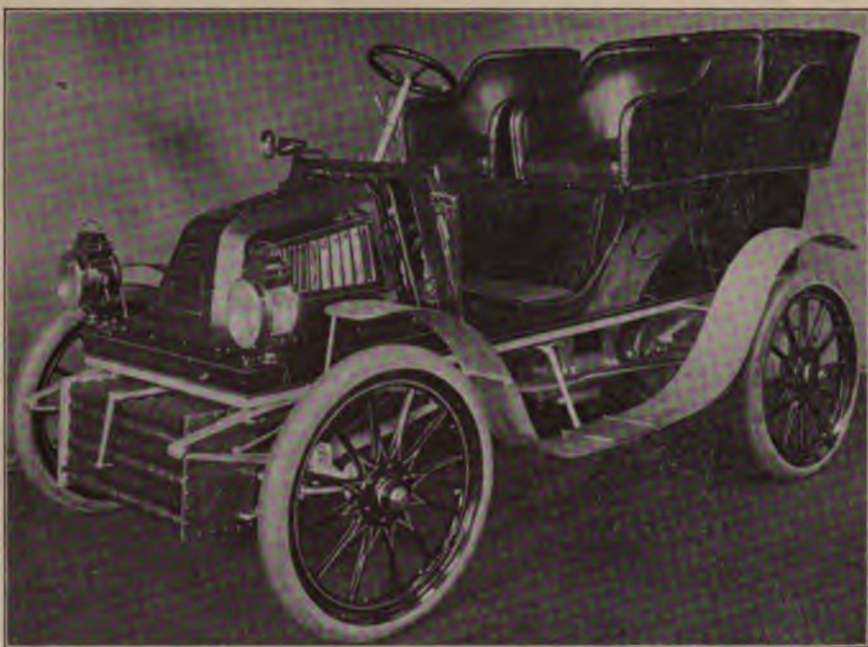
The exhaust ports open into the cylinder near the middle of the length thereof and auxiliary exhaust ports are provided at the forward end of the cylinders, so as to be just cleared by the pistons at the end of the forward stroke. The exhaust valves are lifted once for each revolution of the crank. The method of operation is somewhat as follows:

The pistons are shown at the end of the forward stroke and the cylinders may be considered filled with burnt gases at atmospheric pressure. As the return stroke of the pistons begins the exhaust valves are lifted, and the exhaust gases are forced out of the exhaust valves until the piston head passes the main exhaust port. During the rest of the return stroke the exhaust gases are compressed in the cylinder heads and the communicating passage. They expand again during the first part of the next forward stroke, until the piston head reaches the same point where the compression began; then the suction in the cylinder begins and a charge is drawn into the communicating passage and the rear part of the cylinders, while the forward stroke is completed. When the return stroke begins the exhaust valves open again and a part or all of the spent gases remaining in the cylinders is forced out of the exhaust valves. When the piston head passes the main exhaust ports this time, the compression of the charge begins, and at the end of the return stroke the charge is ignited and forces the pistons outwardly. Then the cycle begins anew.

It will thus be seen that the engine works with partial charges. The inventor informs us that with an actual stroke of 6 inches he has an effective suction and compression stroke of only 2 inches, while the expansion stroke is of course equal to the whole 6 inches. One objection to such an engine would, of course, be that which applies to all compound engines, that they must necessarily be heavy to develop a given power.



Columbus Motor Truck.



Howard Chainless Tonneau.

Soller's Gasoline Automobile.

The illustration herewith shows the chassis of a gasoline automobile designed by Eugen Soller, of Basle, Switzerland. The vehicle has a double cylinder, vertical motor in front. The two cylinders are arranged in a transverse plane. The transmission comprises expanding pulleys for varying the speed ratio. The steering is effected by means of a hand wheel in the usual manner.

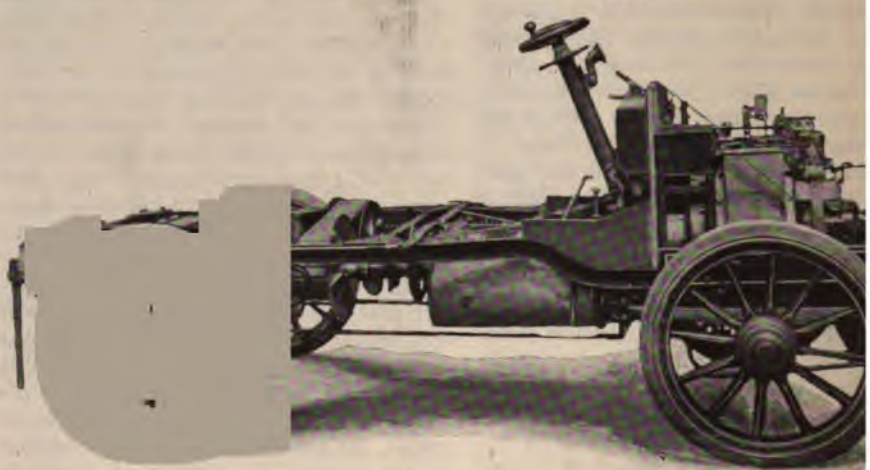
The Warner Balance Gear.

The Warner Differential Gear Company, of Muncie, Ind., are placing a spur differential gear on the market which has some new features. Unlike most equalizing gears it is arranged so that a sprocket or gear crown may be bolted to either side of its drum. Each pinion is placed in a socket and runs on a case hardened bolt, w threaded at one end and also tapped mit a small set screw, and is provide a flange at the other end of a slightly diameter than that of the pinion (o To replace or inspect any pinion it necessary to take the drum apart, th ation being performed with a screw

The company manufactures these in four sizes. One type is provided centrally located sprocket for diff drums that are equipped with two bands.

Westinghouse Charging Ou

With the increasing use of electri mobiles both as pleasure carriages delivery work a demand has spru for charging outfits for private and for storage stations. The W house Electric and Manufacturing Co state that to meet this demand the carefully considered the practical r ments of every day service, such familiarity with storage battery ch limited opportunities for attention



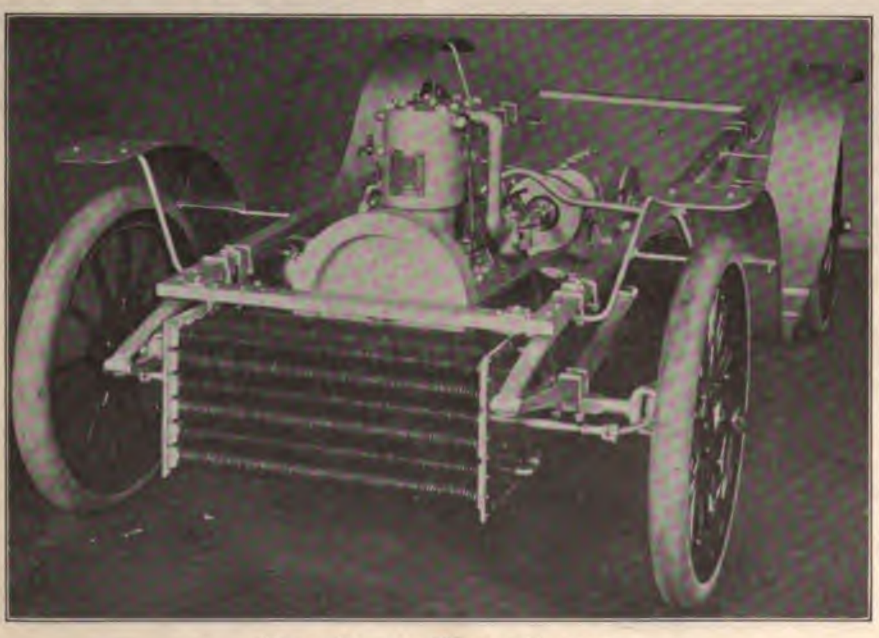
Chassis of Soller's Gasoline Automobile.

and have planned to reduce the e of installation as much as possibl sistent with reliability.

Their line of standard apparatus f purpose is quite complete, meeting tically all line conditions, and bein able for charging batteries of fr to 44 cells. The company manuf station or garage outfits and privat fits, and each of these in three di forms, viz., switchboards, motor erator sets and engine driven sets.

The "Howard Chainless" Ga Car.

The Trojan Launch and Auto Works, of Troy, N. Y., are placing market a gasoline automobile wi tachable tonneau body which is known as the "Howard Chainless." machine is to be built in three size motors of two, three and four cy and 12, 18 and 24 horse power r ively. The smaller machine is th illustrated herewith.



Front View of Howard Chassis.

body is supported on full elliptic s. Wood artillery wheels are used, :hes in diameter, with tires of 3 width. The tonneau is easily re- and a finished deckboard is pro- to take its place. The rear wheels ovided with brake drums and a spe- nergency brake is provided to act countershaft.

transmission gear is the Howard g gear device, which we illustrated scribed a short time ago. It gives speeds forward and a reverse and is lled by a single lever. On the ear the transmission is direct to the cle by bevel gears, as shown in the ation. The gears are encased and an oil bath. The cooling water is ted through a radiator in front and nk by means of a gear pump. The is equipped with wheel steering, is said to be self locking. The of the motor may be controlled by foot or by hand.

larger machines will be provided n automatic motor governor and a feed magazine oiler. The vehicles holstered in hand buffed leather and id to be finished very highly. The of speed of the large machines is d to be from five to forty miles per

company are also placing on the a runabout with a double cylinder radiating coil and shifting gear ission, to be known as the n."

he Crystal Palace Show.

London Automobile Show opened Crystal Palace on January 30, and is o comprise the finest collection of es and accessories ever exhibited in nd. As regards superficial area the s larger in dimensions than the Paris ition, and the displays are of the pal European makes, including Pan- evassor, Daimler, Gardner-Serpol- De Dion-Bouton, Napier, Wolseley, Arial, the City and Suburban Elec- ompany, Darracq, De Dietrich, De- le, Gladiator, Benson and Brush. is a good showing of American ma- s. The Anglo-American Motor Car any showed a 20 horse power Win- ouring car, some Baker electric cars torpedo shaped freak. There is also display of Duryea cars, Locomobiles our or five White steam cars. Alto- r more than 200 firms, exhibiting than 600 machines, are on the stands, in the grounds are 120 automobiles ng for the benefit of intending pur- rs.

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automobile of Charles Auger, of son, N. J., was set on fire in the owing to the professional chauffeur ng a lighted cigarette around the ne containing parts. The fire was uished by the fire department with a cal fire engine.

MINOR MENTION

A. M. Walker, Cedar Bluffs, Neb., a rural mail carrier, has bought an automobile for use in his work.

Indianapolis, Ind., manufacturers and dealers intend to have an automobile show in the near future.

It is rumored that Jerry Ward, Kokomo, will establish an automobile factory at Frankfort, Ind.

At the meeting of the A. C. A. on Tuesday evening, February 3, a discussion was held on "The Lessons of the Automobile Exhibition."

The first of a series of talks on the gasoline engine for the benefit of automobile owners was given at the Y. M. C. A., Minneapolis, by N. E. Brown, on January 17.

Joe Newby, New Castle, Ind., intends to build a large addition to the rear of his bicycle shop for the purpose of storing automobiles.

E. H. Corson, Boston, Mass., is planning an extensive tour of motor cyclists to extend as far west as St. Louis and as far south as Portsmouth, Va.

Waldo W. Waterman is the general manager of a company which will establish an automobile stage service between Foster and Julian, Cal., a distance of 35 miles.

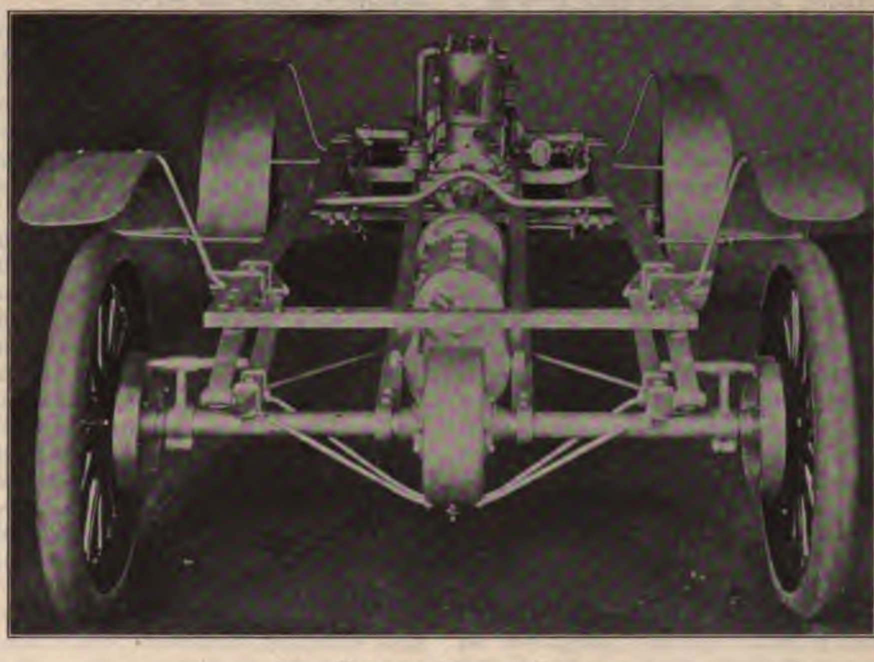
It is reported that one or two of the American candidates for the Gordon Bennett cup race intend to enter the Paris-Madrid automobile race, which starts on May 24. Entries, which may be made with the secretary of the Automobile Club of France or the secretary of the Automobile Club of Spain, close on the 15th inst., although they will be accepted at double fees up to May 15.

Ground has been broken for the erection of a new automobile station which the Conrad Mueller Company, Indianapolis, Ind., is to put up. The floor space is large enough for 100 automobiles.

At the recent annual meeting of the N. A. A. M. it was decided to recommend to the A. C. A. a speed contest up a hilly road and down on the opposite side with a few compulsory stops on the down run.

The Automobile Club of America will give a demonstration of automobile speeds to the New Jersey Legislature at Trenton in the near future, in connection with the automobile legislation at present occupying that body.

Articles of partnership have been filed at Ann Arbor, Mich., by A. R. Welch, J. D. Watson and Fred S. Welch on behalf of the Chelsea Manufacturing Company, Limited, the capital stock of which is \$200,000, which will manufacture the Welch touring car.



REAR VIEW OF HOWARD CHASSIS.

J. C. Brandes has taken the United States agency for Cudell & Co., of Aix-la-Chapelle, Germany, and has opened an office at 28 West Thirty-third street, New York city. He will have his main agency and storage with the Motor Vehicle and Repair Company, 121 West Thirty-first street, where his machines will be on exhibition.

The value of the automobile as an adjunct of war was illustrated last week by the Second Signal Corps, N. G. N. Y., in the armory at 801 Dean street, Brooklyn, in establishing a signal station. To the vehicle was attached a tender corresponding with that of a locomotive, and from it were shown electric lights for night signals. The power for the lights was generated by the automobile and communi-

cated to the tender by a belt passing over one of the wheels.

The Eckhart Carriage Factory, of Auburn, Ind., will go into the manufacture of automobiles.

John H. Bates & Son, Woburn, Mass., are about to erect a new building as a showroom for automobiles.

The Automobile Club of America, New York, will give the opening run of the year on February 22. The destination will be Lakewood, N. J.

Dr. Nichols, Mansfield, Ohio, recently made use of the storage battery in his electric automobile for operating an X-ray coil in the examination of a fracture.

The Close Cycle Company, Olean, N. Y., are at work on a gasoline touring car of French design, and during the summer they expect to manufacture one machine a month.

Several unnamed automobile owners of Attleboro, Mass., contemplate erecting a storage stable, which is to be placed in charge of an experienced chauffeur and repair man.

Chicago contemplates installing automobile engines in its fire department, and a chemical engine and battalion cart made by the International Fire Engine Manufacturing Company, of New York, is now being tested.

According to a late report two-thirds of the space in the annex and all in the main building of the Coliseum at Chicago has been let for the coming show and the exhibits will be twice as large in number as last year.

Fischer Motor Vehicle Company, Hoboken, N. J., has been incorporated with a capital stock of $2,000,000, to manufacture automobiles. The incorporators are William H. Burnett, Charles H. Stewart and William H. Crolius.

At a regular meeting of the Newark, N. J., Automobile Club on January 28 James Mills was elected a delegate to the National Good Roads Convention at Chicago, where he will advocate the passage of the Congressional bill appropriating $20,000,000 for the benefit of good roads.

The J. Stevens Arms and Tool Company, Chicopee Falls, Mass., are making some improvements in their factory buildings. They are constructing bridges to connect the fourth and fifth floors of their buildings Nos. 1 and 2, and are removing their machine shop from building No. 1 to No. 2.

It is rumored that there is a misunderstanding between the Massachusetts A. C. and the Boston Automobile Dealers' Association, the reason given being that two leading members of the association have been refused membership in the club. The dealers are said to be planning to organize a rival club.

It is reported that a number of automobile manufacturers have agreed to pay royalties to the Electric Vehicle Company, Hartford, Conn., for infringement of the Selden patent, and that a suit has been brought against Smith & Mabley, New York, importers of French and German cars, for alleged infringment.

The Moyea Automobile Company has secured a site for a factory at Rye, N. Y.

A company proposing to build freight automobiles is seeking a location at Garrett, Ohio.

The Boston Gear Works have recently taken up the manufacture of double helical or fishbone gears for use on automobiles.

An automobile show will be held at Buffalo, N. Y., from March 9 to 14 under the management of W. C. Jaynes and Frederick J. Wagner.

The Merchants' Specialty Company, of 90 Warren street, New York city, have ordered 200 automobile bodies from the Flint Body Company, of Flint, Mich.

The total exports of automobiles from the United States during 1902 amounted to $1,069,872, compared to $367,371 in 1901, an increase of nearly 200 per cent.

Henry E. Bothen has made application to the board of supervisors of San Francisco, Cal., for a franchise to operate an automobile line on Van Ness avenue.

It is announced that the General Electric Company will shortly actively enter the automobile field with a gasoline machine to be built completely at the Lynn works.

The Automobile Storage and Trading Company, of Albany, N. Y., have taken the Oldsmobile agency for 1903 for the following counties: Albany, Rensselaer, Montgomery, Fulton, Washington, Saratoga and Schenectady.

W. E. Hatcher, late of the Packard Motor Car Company, was given a farewell reception and presented with a watch by the employees of the company on Wednesday evening, January 28. Mr. Hatcher, it is stated, retains his holding of stock in the Packard Company.

Among recent New Jersey incorporations is that of the United Motor and Vehicle Company; registered office, Cranford; capital stock, $100,000. Corporators, Eugene W. Anston, Austin E. Kirby, William Hughes. The company is to manufacture motors and vehicles of various kinds.

Entries for the Gordon Bennett cup race with the A. C. A. closed on January 31. The candidates for the eliminating race are: Percy Owen, New York (Winton); L. P. Mooers, Cleveland (Peerless); H. S. Harkness, New York, and C. W. Matheson, Grand Rapids, Mich. Alexander Winton has been accorded a place on the team without participation in the eliminating contest.

Smith & Mabley, of New York, have presented to the Asbury Park (N. J.) Board of Trade a proposition to establish an automobile factory near that city. They state that their requirements are a plot on which to erect a building or a factory already erected with at least 25,000 square feet of floor space.

Honore Palmer has resigned as president of the Chicago Automobile Club, and Charles W. Gray was elected in his place at a meeting held on January 29. The club appointed a committee of five members to work against the automobile ordinance before the City Council Judiciary Committee, as follows: K. C. Pardee, J. B. Burdette, Dr. F. C. Green, W. H. Hoops and F. X. Mudd.

Winton-Fournier Race Agreement.

The following contract has recently been signed for a match between Alexander Winton and Henri Fournier:

"We hereby agree to compete in two automobile races, and, if a tie results, to have a deciding contest—the first race to be at the Empire City Track, Yonkers, N. Y., and the second at the Cleveland Driving Park, Glenville, Ohio.

"Saturday, July 25, 1903, shall be the date of the first race, with July 27 or the next available date in case of postponement. The distance of this event shall be 25 miles, standing start, contestants to start on opposite sides of the track, one at the wire and one at the half mile post, positions to be decided by toss of the coin; the winner to be that operator who completes the distance in the fastest time.

"Should there be an accident to either machine in the first mile the race shall be stopped and restarted.

"A date between August 1 and 12, to be decided by March 1, shall be the date of the second race, with the next available date in case of postponement. The distance of this event shall be 25 miles, standing start, machines to start on opposite sides of the track, one at wire and one at the half mile post, positions to be decided by toss of coin; the winner to be that operator who completes the distance in the fastest time.

"Should there be any accident to either machine in the first mile the race shall be stopped and restarted.

"The winner of two races of the series shall receive a $1,000 cup, same to be supplied by the Empire City Trotting Club and the Cleveland Driving Park Association.

"Should a third race be necessary, the track shall be selected on which the fastest time is made in the two previous races. It is understood that Fournier and Winton shall not meet in a match or open automobile racing in the United States previous to this series.

"Sanction and rules of the Automobile Association shall govern these races."

Accidents.

Dr. Clifford B. Okey's automobile was badly damaged recently by coming in collision with a street car in Columbus, Ohio, while on his professional rounds, and the physician received a severe shaking up.

Deputy Tax Commissioner Thomas F. Larkin, of New York, was seriously injured on January 24, owing to a gasoline explosion on an automobile he was riding in. It was thought that the cylinder had been cracked by freezing.

...OUR... EIGN EXCHANGES

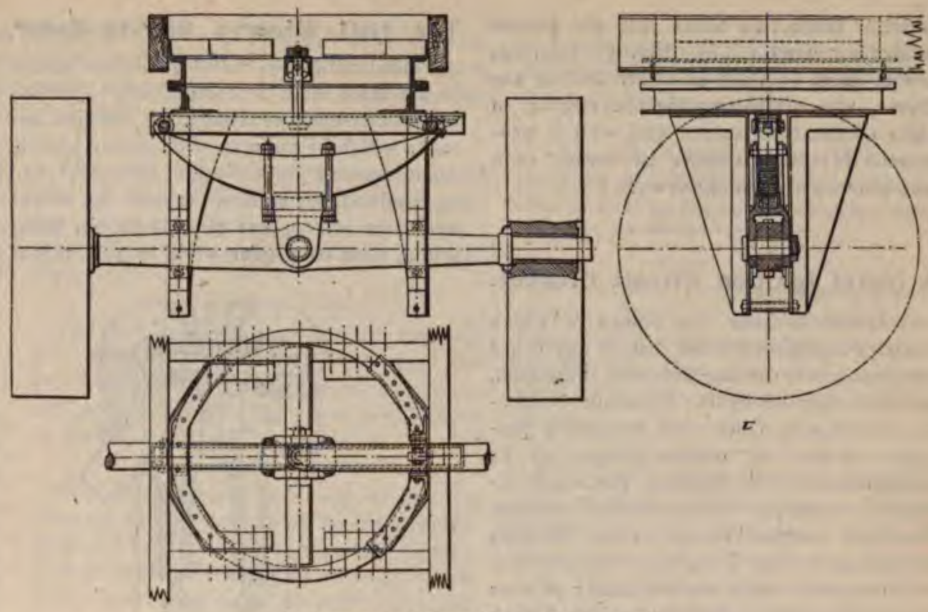
/ Simpson & Bibby Steam Truck.

s. Simpson & Bibby, of Manches- land, have recently built a 5 ton uck which is to make regular runs ewly constructed road at Accra, frica, 70 miles into the interior. ler is of the firm's regular flash l is capable of evaporating 1,000 of water per hour. The chief nov- des in the engine, which is single nd consists of four cylinders, ar- liagonally, 7 inches in diameter by stroke, running normally at 450 ns per minute; the arrangement f the use of a simple two throw aft and gives a turning moment it to that of four cylinders work- independent cranks set at right o each other. The two opposite work onto one crank pin through on bush; the whole surface of the is available for each cylinder as it nto the working stroke. The reg- f steam to the cylinders is by plain es only, operated by cams on a immediately above and in gear crank shaft; advantage is again the diagonal design, one set of rving to regulate the admission ust of two opposite cylinders. The s variable for forward motion and for reverse; the "linking up" is shed by simply sliding the cam axially, thus bringing different to operations having contours to required regulations.

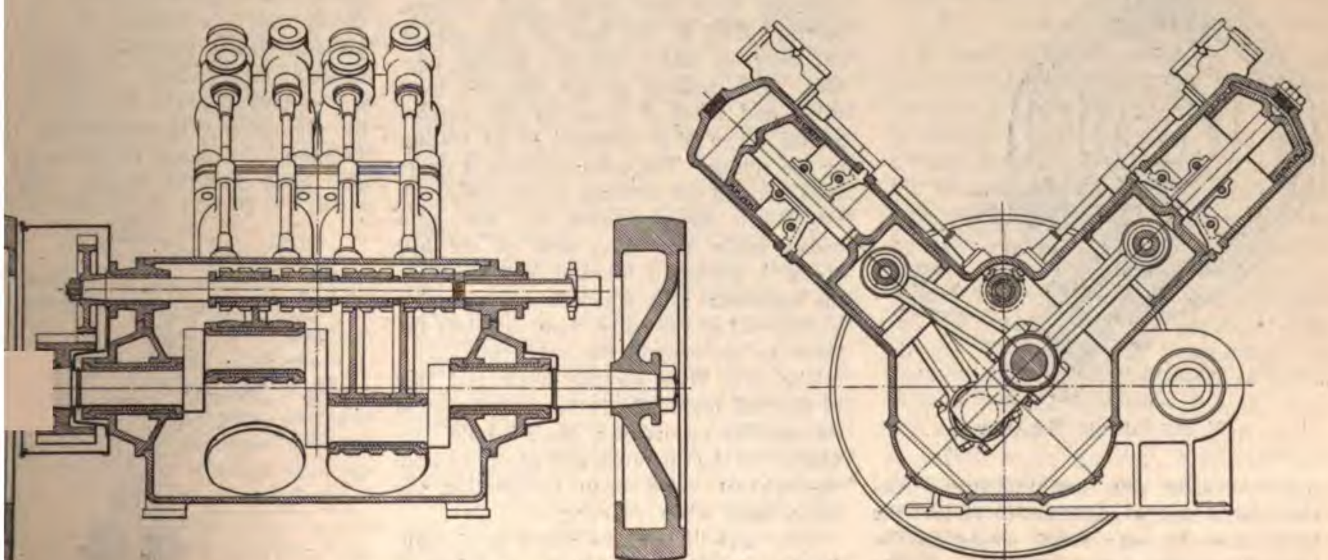
e bearings on the crank shaft, ins and countershaft are of the ze and interchangeable. When ad they are all in constant thrust. smission of power from the crank shaft to the road wheels is done in three stages, viz., from the crank shaft to the first countershaft by cut gearing of bronze and steel—this countershaft has its bearings fixed firmly in the engine casing to insure alignment; from the first countershaft to the differential box on the second countershaft, and from thence to each road wheel by hardened steel roller chains having a breaking stress of not less than 30 tons. The differential gear consists of machine cut spur wheels only, no bevels being anywhere employed.

Two speeds are provided of approximately 6 and 2 miles per hour with the engine running at 450 revolutions per minute. By simply changing the chain pinions, speeds of 4½ and 1½, or 3 and 1 miles per hour can also be obtained. On the inside of each road wheel hub is fitted a winding drum which can be uncoupled to work independently of the road wheels. The front axle and steering gear consists of a fore carriage or turntable, the axle being free to oscillate vertically about its centre, allowing the vehicle to accommodate itself to undulations of road surface without causing any twisting stresses on the main frame. The steering is accomplished by hydraulic cylinders fixed to the main frame which pull the turntable round by means of steel cords.

The pressure for steering is supplied by the feed pumps and controlled by a suitable valve, the steering being effected by slight movement of the steering tiller, fixed in front of the driving seat; the water after use in the steering cylinders is returned to the tanks. Three tanks are fitted, two on the platform, each having a capacity of 100 gallons, and one, slung underneath, of 200 gallons capacity. The latter tank is filled by means of a steam water lifter and suction, capable of delivering 50 gallons per minute; the two upper tanks are filled from the lower one by a small lifter, and it



SIMPSON & BIBBY FORE CARRIAGE.

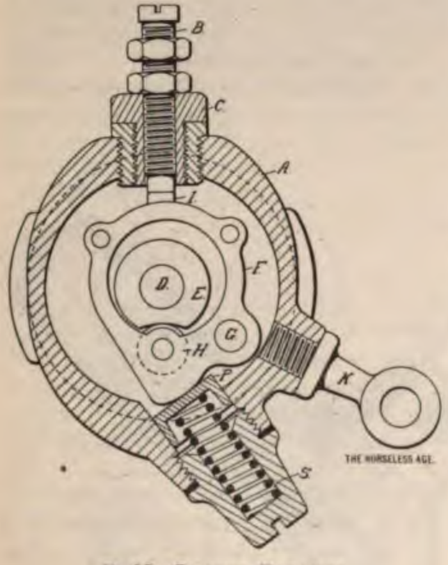


SIMPSON & BIBBY SINGLE ACTING STEAM ENGINE.

is from these two tanks that the pumps take their feed. The driving, steering, brakes, feed, etc., are all controlled by the driver, who sits alongside the engine, in sight of the mechanism, and who is protected from the weather by means of a wooden canopy.—*Engineering*.

A Novel Ignition Circuit Breaker.

A circuit breaker the design of which deviates completely from that of any other type known is the one herewith illustrated, which is applied by the Fabrique Nationale d'Armes de Guerre de Herstal, a Belgian concern, to bicycle motors of its construction. The working parts are enclosed in case A. The stationary terminal B of the circuit breaker passes through an insulated plug C screwed into the wall of the casing. D is the secondary or cam shaft upon which is fastened a cam E with a depression at one part of its circumference. This cam is surrounded by a ring F, which is hinged in the casing at G, and is provided with a roller H with which the cam surface engages, and also with a movable contact point I. A coiled spring S, located in a cap screwed into the wall of the casing, forces the ring roller against the surface of the cam, through the intermediary of a piston P, and when the roller drops into the depression on the cam the movable contact I establishes connection with the stationary terminal B, which is interrupted a moment later when the depressed part of the cam passes the roller. The eyebolt K serves to slightly rotate the casing A around its axis and thereby alter the time of ignition. One obvious advantage of this construction is that all the working parts are completely enclosed and

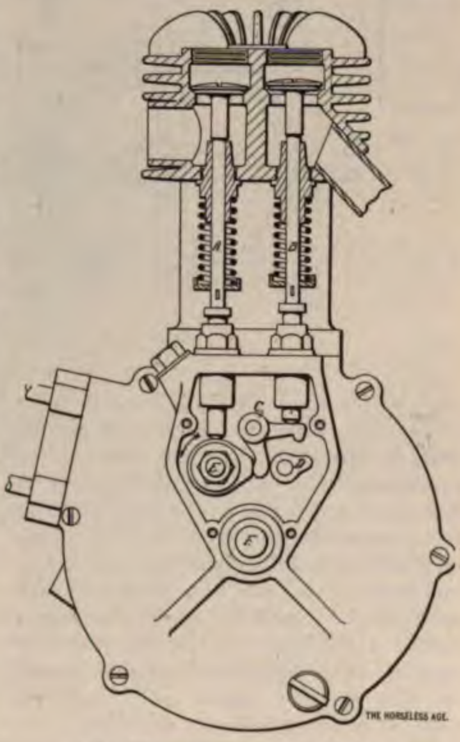


F. N. Circuit Breaker.

protected from dust and moisture. Another advantage would seem to be that the break must be very rapid, owing to the greater leverage of the contact point over the point of cam action.

The 1903 Minerva Bicycle Motor.

Perhaps the first make of bicycle motor to be fitted with a mechanically operated inlet valve is the Minerva, a Belgian design, which is popular with motor bicycle manufacturers both on the Continent and in England. A section through the valves and view of the cam gear is shown herewith. The cam gear of a bicycle motor



1903 Minerva Bicycle Motor.

is always int resting, as the small space into which the mechanism has to be cramped to limit the over-all width of the motor taxes the ingenuity of the designer and has led to many original solutions.

In the drawing A represents the stem of the intake valve and B the stem of the exhaust valve. E is the half speed shaft upon which is fastened the cam which operates both the intake and exhaust valves. Half of the face of the cam is cut away, so that it has two distinct profiles. The smaller profile lifts the inlet valve and holds it open for the correct period, when it is returned to its seating by the spring. The exhaust valve is operated through the medium of the bell crank C. When the projection on the cam comes under the lower arm of the bell crank it pushes it forward, and so raises the horizontal arm, which in turn operates on the end of the valve stem, and lifts the valve as depicted in the engraving.

The cam D below the horizontal arm of the bell crank C can be turned around its shaft by means of a small handle convenient to the operator, and serves to hold the exhaust valve open in starting the motor and when coasting.

The valve lifter of the motor is so regulated as to lift the exhaust so slightly at option that it has the effect of weakening the mixture so that one can drive slowly and smoothly without switching the current off. A throttle is fitted to the Longuemare carburetor, and also an air lever, by means of which the air from the extra inlet from the top can be wholly shut off; the supply is then drawn altogether from the lower inlet, and rushes by the spray and so draws a full supply of gasoline. When running at high speed, and the suction is great, this air inlet should be open, but when at low speed and the suction is reduced the inlet should be closed or partially closed to ensure sufficient gasoline being sucked up. Two accumulators are fitted, and a particularly nice refinement is to be found on the top of the cylinder, consisting of a kerosene cup with a spring controlled valve. On filling the cup with kerosene, and pressing down the handle of the valve the kerosene drops into the cylinder.

Club Organization in Russia.

With regard to the St. Petersburg Automobile Club, the formation of which was announced recently, we learn further that the annual membership dues are 100 roubles (about $75) and entrance fee 50 roubles. The constitution of the club is now being examined for approval by the Minister of the Interior, and the club will hold its first meeting immediately upon the approval of the constitution. As the membership fee is so high it is proposed to establish a second class or secondary club with a membership fee of only 15 roubles and entrance fee of 10 roubles.

The Albany Superheater.

Superheating attachments to the boilers of steam automobiles are practically a necessity in England, unless a condensing system is used, as the law prohibits the emission of visible steam upon the highway, "except from any temporary or accidental cause." As a consequence we learn that one of the English agencies for American steam cars has decided to equip all its vehicles with a particular make of superheating tube, which is illustrated herewith. This device, which is manufactured by the Albany Manufacturing Company, Limited, of London, is connected between the boiler and the throttle valve, and is

Albany Superheater.

d in the space between the burner e boiler. It will be noticed that the is shaped in serpentine form, one of which probably is to get as much of tube in a single layer as possi- The manufacturers also make the that this form offers considerable nce to particles of moisture, thereby ring the device more effective as a eater, while at the same time the nce to the passage of the steam is

Muffler Competition.

competition of mufflers for gasoline s organized by the A. C. F. will be t the laboratory of the club beginning 1. All the mufflers entered for the tition will be tested on the same mo- single cylinder one of 5.6 inches bore 4 inches stroke. The motor will work a compression of 4 kilograms per centimetre and the speed will be hat there will be from 400 to 500 ex- strokes per minute. The mixture e kept constant as nearly as possible. imination trial will first be held and final trial the motors will be con- with the exhaust pipe in pairs of and tried alternately. The factors which the competition devolves are essness, absence of back pressure, nd weight, prevention of smoke, sim- and cost of manufacturing. Muf- may be entered for competition till ary 15, the entry fee being 20 francs.

f. Hele Shaw gave a lecture on au- biles at the Royal Institution, Lon- recently.

e Automobile Club of France an- ces a competition for timing apparat- commencing February 9. Cash s and medals are offered.

e racing rules of the A. C. F. have amended as follows: If a driver passes trol without stopping for the period by the organizers of the race, he shall nalized a number of minutes equal to tal time of neutralization, provided he prove that the officials were not at post; but failing this proof, the pen- tion will be trebled. If, in the opinion e judges, the ignoring of the control intentional on the part of the driver, ay be disqualified.

e number of automobilists getting trouble with the French police is so that the rules of prison life are hav- o be as highly specialized in their re- as if they were Nationalist Members arliament. Complaints of outraged ty on the part of imprisoned automo- s have become so frequent that the e says the Minister of the Interior ssued a new regulation for the ex- e benefit of aggrieved votaries of the locomotion. Persons imprisoned for h of motor car regulations are to be regarded merely as "accused persons," are to have the right to find their own food, to be only slightly searched, to escape the "douche" and to be spared prison dress.

The total value of automobiles imported into the United Kingdom in 1902 is $5,517,-820, motor cars figuring as one of the largest items in the report on colonial and foreign trade.

The first issue of a new German automobile publication, *Automobil Welt*, has just come to hand. It is excellently gotten up and promises well. The paper is published in Berlin, S. W., 68 Lindenstr., 16.

The Paris-Madrid race will be run on May 24, and on January 15 the Automobile Club of France will begin receiving entries. Entries will be received up to May 15, but after April 15 the entry fees will be doubled.

Baron Henri de Rothschild, well known as an enthusiastic automobilist, was sentenced at Mentone, January 15, to three days' imprisonment and a fine of $3 for furiously driving an automobile. He appealed.

A meeting was held at the Great White Horse Hotel, Ipswich, England, on January 7, for the purpose of taking preliminary steps toward forming an automobile club for the Eastern Counties. After some discussion it was decided to form an Eastern Counties Automobile Club, and to invite membership from Norfolk, Suffolk, Essex, Cambridgeshire and Hunts; to suggest a subscription of one guinea per annum; and to obtain rules from other county clubs, upon which all automobilists in the district should be invited to give their opinion at another meeting, shortly to be held.

There has been (during the year in England) a great increase in the number of motor cycles on the roads, and it is a class of trade which is likely to increase in 1903. Generally speaking, the machines are made in the cycle factories, though the manufacture of the motor itself involves the establishment of what is really a new department, with new plant and machinery. The past year has been notable for the enormous growth of the motor car industry and the increasing use of motor traction in industrial work. The mid-counties have not the monopoly of this trade that they had in early days, and still possess, in the cycle making. Motor making factories are springing up in all parts of the country, and it is something to know that English exhibits took a decidedly good place in the recent Paris Exhibition. Large capital sums are called for in the establishment and carrying on of the industry, and the rapidity with which patterns become obsolete and the want of exactness of knowledge as to the mixing of the propelling gases of motors make clear profits difficult to secure.—*London Times.*

A recent census places the number of automobiles in Switzerland at 387, and the number of motor cycles at 126.

The *Daily Mail* of January 12 states that the King has expressed disapproval of the idea of holding the Gordon Bennett race in England.

At Dresden, Germany, where a trolley omnibus line is being installed, between Klotzsche and Konigswald a heavy snow recently fell, when successful experiments were made, it is reported, with an electric sleigh.

The "Pau" automobile week, from February 22 to 26, will comprise the following principal events: 22d, race, first prize, 9,000 francs; 24th, mile and kilometre race; 25th, hill climbing contest in the Pyrenees; 26th, competition of touring cars.

Automobile clubs are in process of formation at both Cambridge and Oxford universities in England. H. Gregory (St. John's College) is the honorary secretary of the first mentioned and W. L. Creike (Christ Church) is directing the organization of the latter.

At the meeting on January 5 of the committee of the A. C. G. B. and I. some correspondence was submitted as to the possibilities of a bill being passed through Parliament with reference to the Gordon Bennett Cup, and instructions were given as to the steps to be taken.

In an account of a tour in France and Italy with a car hired for the purpose, which appeared in *Country Life*, it is stated "the expense of hiring such a car as we employed was £75 a month, which was not exorbitant, considering this includes the chauffeur's wages and all repairs. The gasoline differs in various countries, in France the cost being £1 per day for the 100 miles traversed, while in Italy the same amount came to £3."

A decision of some interest has just been rendered in Paris in the Fifth Chamber of the Court of Appeals in an action to declare a contract of sale void on the ground of breach of warranty. The plaintiff, Madame Clarke, bought a small motor car from a French firm of manufacturers for 3,800 francs, but it broke down so frequently that she was unable to make any regular use of it. She accordingly asked for her money back and obtained judgment. The defendants appealing, the higher court reversed the judgment, on the ground that the purchaser of an automobile cannot reasonably expect it to remain in perfect order for any length of time, however carefully it may be used, "these machines, consisting of many complicated and delicate organs the maintenance of which, in perfect equilibrium, may be considered as a succession of fortunate circumstances liable to be interrupted at any

moment." There being no proof that the car in question was specially defective the court held that the contract was good.

The German Minister of the Interior, it is reported, has decided that an automobile is at present not an appropriate official conveyance for a "landrat" (county squire).

The Automobile Club, of St. Petersburg, has now been definitely established, and comprises forty members. M. Reiss is president, Count Schulenburg, vice president and M. Nagel treasurer.

The official organ of the Automobile Club of France, the *Auto Vélo*, has just been enjoined by court from use of its name, on complaint of the *Vélo*, an older rival publication, under penalty of $40 per day if the use of the name is continued.

It is reported that in Monte Carlo recently in a single day six automobilists were arrested for furious driving, marched off to police headquarters and fined 1,000 francs each. The Casino is evidently losing some of its effectiveness in stripping the foreigners.

It is claimed by a London daily that the practice is growing in England to overrate the horse power of vehicles to raise their apparent value. A car shown for the first time at the recent Paris Show with a 12 horse power motor is now being advertised in London as a "20 horse power"! The motor undoubtedly gives more than 12 horse power on the brake, but to describe it as a 20 horse power is, to put it mildly, incorrect.

Speed Discussion Before Farmers' Club.

At a meeting of the Farmers' Club, at Mineola, L. I., ex-Senator Cocks delivered an address in which he gave a general review of what had been done and what it was proposed to do at the present session of the New York Legislature in regard to amending existing automobile laws. He stated that the views of the Long Island Highway Protective Association were that the rate of speed should be limited at which the machine should pass any person in the highway, or any person riding, leading or driving any horse or other animal; that the rate of speed should be limited in crossing intersecting streets; and that there should be a general restrictive measure as to limiting the speed in the open country under all ordinary conditions.

D. W. Munger thought there should be a provision requiring every operator of an automobile to take out a license and have it in his possession at all times when operating a machine. He would not restrict the licensing to chauffeurs, but require owners who ran their own machines to have a license, too. Automobiles, he thought, should not be run on the public highways by persons who were not experienced.

R. C. Colier said the best cure for the whole trouble was to build highways throughout the island and confine them to the use of automobiles and trolleys.

Halstead Scudder offered a resolution embodying the views of the club to the following effect: That the present law regulating the speed at which automobiles may be driven be not disturbed, but that additional statutes be enacted providing that all operators of automobiles be required to obtain a license; that a failure to comply with that part of the automobile law—Chapter 531 of the laws of 1901—referring to the equipment of the machine and stopping on signal be made a misdemeanor, punishable by a fine or imprisonment, or both; that numbers be substituted for initials, and that they be placed on the lamps as well as on the machine, and be in plain figures.

The resolution was adopted.

"The Commercial Possibilities of the Electric Vehicle."

A lecture was delivered at the Automobile Club of America on Tuesday evening, January 27, by Hayden Eames, of the Westinghouse Electric and Manufacturing Company. Mr. Eames expressed the opinion that the electric business automobile had been a practical possibility for many years; the trouble encountered in its introduction had been that prospective users insisted upon compliance with unreasonable specifications. There was also a field for the motor wagon propelled by prime movers, and a great deal of work had been done, particularly in England, in the adaptation of steam to commercial transportation purposes. As favorable a figure of cost as one penny per ton mile had been obtained in Lancashire, but there was, nevertheless, a persistent effort noticeable in England to get away from steam. Gasoline as a motive power for commercial vehicles became, of course, more promising as the details of the motor and transmission gear were worked out to greater perfection, and he thought that there was a large field for transportation by gasoline motor in districts west of the Mississippi, where the distances are long.

Much is being said about the rapid depreciation of storage batteries, but it was nevertheless a fact that for the last four years the cost of upkeep of the mechanical part of the electric vehicle had exceeded the cost of upkeep of the batteries.

Mr. Eames suggested a form of cost accounting, according to which nothing needs to be written off for depreciation of the storage battery. The positive plates will last for a certain time, when they are renewed, and the negatives are similarly renewed, after a longer period. The item of renewals thus covers the entire expense of keeping the storage battery, as with periodical renewals the same battery will, in a sense, continue in use indefinitely. In the case of one delivery wagon, it was stated, the renewals had amounted to only $200 per year.

The difficulties met with in introducing the electric vehicle for business purposes were at present chiefly of a psychological nature. One express company, for instance, objected to the electric vehicle because it required several hours' charging at noon, and this interfered with their regular routine. As an example of rational application of the electric vehicle to commercial purposes the case of an electric express wagon in use on the hilly streets of Pittsburg was cited. This wagon had been running all last summer without being recharged during the day, carrying a load of 1,600 pounds and sometimes as much as 2,000 pounds. During the winter months when the streets were sometimes muddy the work was naturally harder, and the battery had to be recharged at noon for a period of about two hours. This charging was effected at a rate greatly exceeding the normal, without any bad effects having been noticed on the battery. The vehicle is equipped with iron tires, and when snow came they gave, of course, insufficient adhesion. The vehicle was then taken to a blacksmith shop, and a special set of tires were shrunk on which were provided with small transverse teeth for the rear wheels and a circumferential flange for the front wheels. This work, which required three-quarters of an hour's time, would have been strenuously objected to only a few years ago. During the day that the special tires were put on, horses were being sharpened at the blacksmith shop all day long, and it was observed that the same horses came back to be resharpened the next day, while the same special tires remained on the vehicle for fourteen days. The absence of rubber tires removes one serious item of expense, but it has been found that to use steel tires under all conditions of weather at least three sets have to be kept, ice and snow requiring each a special form of tire surface.

A vote of thanks was tendered Mr. Eames at the conclusion of his lecture. President Scarritt, of the A. A. A., presided at the meeting.

Pittsburg Automobile Club.

An automobile club was organized at Pittsburg, Pa., on January 27. The charter members include George H. Flinn, H. P. Maxim, D. N. Seely, W. P. Hilliard, W. Linford Smith, J. F. Burke, Dr. P. J. Eaton, A. R. Neeb, W. L. Elkins, Robert B. King, Harry Miller, Reuben Miller, Jr., R. A. McDonald, George L. Hailman, J. C. Russell, B. W. Lewis, Kirk Lincoln, Dr. J. A. Hawkins, T. Whitmore, A. A. Weisman, W. B. Zimmerman, W. Casper Cook, S. B. Hays, W. J. Lewis, J. F. Straub, Dr. M. J. E. Moore, C. W. Bray, Dr. George A. Urling, Dr. Harry W. Urling, William

H. La Fountaine, C. H. Dickson, O. E. Vestal, Thomas R. Hartley, J. H. Lindsay, Dr. H. S. Hazlett, J. M. Mashey, W. H. Artzberger, D. N. Carlin, B. L. Jones, W. L. Dixon, Joseph Fawell, C. J. Fleming, John Sloan, A. C. Magill, S. H. McCibbin, M. C. Cameron, L. S. Martin, Edward Kneeland, W. P. McVay, W. C. Temple, Jr., E. B. Byers, D. H. Hostetter, R. W. Bailey, W. N. Murray, W. A. Heyl, A. Neeb, Howard Heinz and A. M. Acklin. The initiation fee is $5 and the annual fee is $5 for active members. Motorists outside the city, but within a radius of 30 miles, may become associate members by paying the initiation fee and the annual fee of $5. A life membership is $500. The membership is limited to 300. They propose to erect a clubhouse. Officers to serve until May, 1904, were elected as follows: President, George H. Flinn; first vice president, J. F. Burke; second vice president, W. C. Temple; third vice president, D. H. Hostetter; secretary, Thomas R. Hartley; treasurer, Reuben Miller, Jr. The following were elected a board of governors: Class I, their term expiring in one year, Reade W. Bailey, W. L. Elkins and Dr. J. A. Hawkins; Class II, with term of two years, A. R. Neeb, Dr. H. W. Urling and George Hailman; Class III, term of three years, E. B. Byers, W. Linford Smith and B. W. Lewis.

The Cleveland Show.

A local automobile show is being held this week at Gray's Armory in Cleveland, Ohio. As a centre of the automobile industry of the country Cleveland certainly ought to be able to give a successful show. The following is a list of exhibitors, according to Secretary W. F. Sayle: Winton Motor Carriage Company, Locomobile Company of America, International Motor Car Company, Waltham Manufacturing Company, F. B. Stearns & Co., Fredonia Manufacturing Company, Kirk Manufacturing Company, Elmore Mfg. Company, Union Automobile Company, Shelby Motor Car Company, Northern Manufacturing Company, Ohio Motor Car Company, Cleveland Automobile and Supply Company, Geneva Automobile and Manufacturing Company, General Automobile and Manufacturing Company, Oldsmobile Company, E. R. Thomas Motor Company, Post & Lester, National Carbon Company, Diamond Rubber Company, Pittsburg Reduction Company, International Automobile and Vehicle Tire Company, D. E. Foote Company, John H. Graham & Co., Kelley Handle Bar Company, Veeder Manufacturing Company, Twentieth Century Manufacturing Company, B. F. Goodrich Company, Electric Storage Battery Company, Fisk Rubber Company, Gray & Davis, L. J. Mueller, Searchmont Automobile Company, Cadillac Automobile Company, Electric Vehicle Company, Hoffmann Automobile and Manufacturing Company, Westinghouse Electric and Manufacturing Company, Autocar Company, Hugh B. Wick & Co., National Motor Vehicle Company, R. E. Warwick, Hartford Rubber Works Company, Neverout Lamp Company, Pittsburg Reduction Company, Sherwin Williams Company, R. E. Dietz Company, The Horseless Age, and *The Automobile*.

LEGISLATIVE AND LEGAL.

The Johnson automobile speed bill was passed by the Indiana Senate with only one dissenting vote.

Mr. Gehman has introduced in the Delaware Legislature an act to control the use of automobiles on the public roads of the State.

W. H. Cushman, Gallipolis, Ohio, has brought suit for $3,547 against the International Motor Car Company. It involves a dispute over the purchase of two automobiles.

A warrant has been issued for the arrest of W. L. Stowe for violation of the automobile speed law at Jericho, L. I., but at last reports the constable had not been able to serve it.

William W. Joliffe has been awarded a verdict for $500 against the Washington Electric Vehicle Company at Washington, D. C., for injuries sustained in a collision with an automobile while riding a bicycle.

George M. Woods, Denver, Col., was fined $25 and costs on January 20 for fast driving of an automobile, which frightened two horses belonging to W. H. Berden. The animals ran away and one ran into a barbed wire fence, practically ruining itself. Woods appealed.

In the case of C. C. Smith, J. L. Smith and Mrs. J. L. Smith, Pittsburg, Pa., against Thomas Wittmer to recover damages for injuries sustained in a runaway alleged to have been caused by defendant's automobile, the jury disagreed after having been out for twenty-four hours.

Three of the automobiles of the Cleveland Automobile Company were attached on January 24 as the result of a suit for damages brought by Frederick R. Gallup, New York, who declared that one of the Cleveland automobiles ran over him and injured him severely while he was at work in Madison Square Garden.

Representative Townsend S. Scudder and A. R. Shattuck, president of the Automobile Club of America, have submitted to Governor Odell, of New York, three amendments to the present automobile law. One provides for changing the speed requirement of 8 miles an hour in incorporated villages, and 20 miles an hour in unincorporated villages to 8 miles an hour within 1 mile of a post office. Sign posts are to be placed designating the distance to the post office. The second provides that if an automobile fails to stop on signal instead of being liable to a civil action to recover damages it shall be deemed a misdemeanor. The third amendment provides for the licensing of all professional chauffeurs. If a chauffeur violates the law he shall be liable for suspension on the first offense, and on the second his license shall be revoked.

At a meeting of the Road and Bridge Committee of the Minnesota Legislature on January 27 the bill to limit the speed of automobiles was discussed. E. J. Phelps, Minneapolis, opposed limiting the speed to fifteen miles and advocated twenty-five miles an hour. Representative Shepard advocated a speed of ten miles. The committee decided to practically test the requirements by taking an automobile ride through the business section of St. Paul.

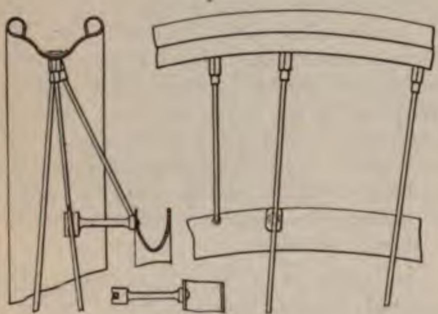
The plant of the Remington Automobile and Motor Company, Utica, N. Y., will be sold at auction on February 11, and the trustee has been directed to reserve from the property of the bankrupt the motor claimed by the Utica Gas and Electric Company, the bill of goods claimed by the Garvin Machine Company, and the lathe claimed by the Syracuse Supply Company; also that all the personal property acquired subsequently to the delivery of the first or trust mortgage be sold in one parcel and that all personal property acquired subsequently to the delivery of the first or trust mortagage be sold in a second parcel.

Representative Hill, of Brownfield, recently introduced into the Maine Legislature an order directing the Judiciary Committee to inquire into the expediency of enacting a law regulating the speed of automobiles. On January 27 the committee heard a bill, the sponsor of which is the Automobile Club of Maine, to limit the speed of automobiles to not more than 20 miles an hour on the country roads, and 8 miles an hour in towns and cities. Charles P. Hatch, of Portland, as representative of the Automobile Club, stated that the object was to establish a uniform system for the State, so that the automobilist in passing from town to town may know when he is within his rights. If towns and cities are left to make their own rules, the automobilist might violate some of them unintentionally. In addition it has been found that there is a tendency in small towns to make regulations unnecessarily severe, and to enforce them with harshness, apparently under the impression that the men who own automobiles are able to pay. One section of the bill provides that whoever refuses to stop his automobile to permit the passing of a restive horse or other domestic animal is liable to a fine. The Hon. Harold M. Sewall, representative from Bath, presented a bill placing the limit at 15 miles an hour in the rural sections.

MOTOR VEHICLE PATENTS..

718,094. Wheel for Motor Cycles.—Adolphe Clement, of Levallois Perret, France. January 13, 1903. Filed October 13, 1902.

The pulley is constituted by a metal rim of V-shaped cross section. It is fitted to the rim upon the one hand by means of small tension spokes, and on the other hand by means of stays riveted upon the pulley rim and which bear upon the wheel spokes.



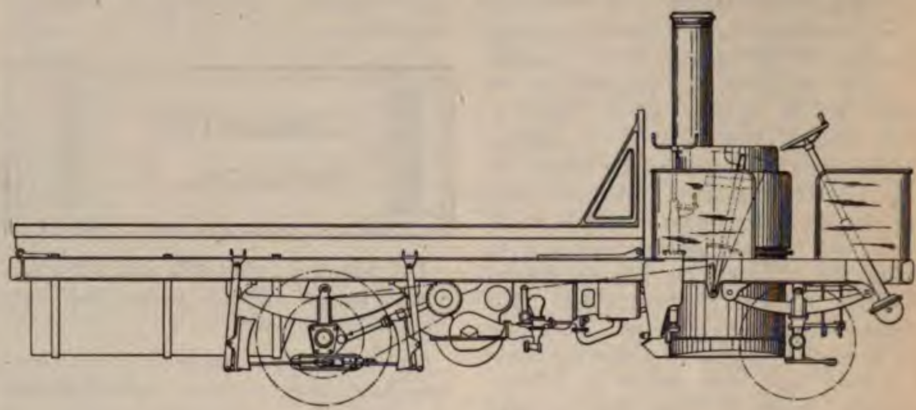
No. 719,037.

The tension spokes are curved upon the side of the pulley rim, and the extremity which enters the V portion of the pulley is riveted to firmly connect the pulley rim and the spokes. The opposite extremity of this tension spoke is connected to the wheel rim by means of a nipple in the same manner as the ordinary spokes of bicycles.

The stays, riveted upon the pulley rim, are of the form of small horizontal pillars, the head of which is enlarged and presents a groove for the reception of the wheel spoke, opposite to which it is situated. In this manner it is rendered impossible for the stay to become displaced with respect to the wheel spoke, and an invariable position is imparted to the pulley rim with respect to the bicycle wheel.

718,213. Motor Vehicle.—William Norris, of Preston, England. January 13, 1903. Filed July 22, 1902.

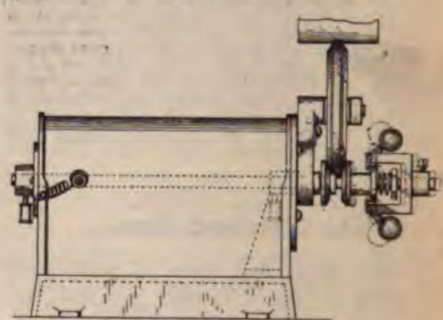
In a steam truck the boiler is mounted in a position upon the fore part of the underframe so that there is a space immediately in front of the same and between it and the buffer beam of the vehicle. The bunker, or coal storage space, is formed at the extreme end of the vehicle, enclosing such space with a guard frame for the purpose of insuring that the particular member upon the carriage adjacent to the extreme end of the frame shall be that which can receive no injury such as would impair the working of the vehicle in the event of a collision or violent contact being made against the buffer blocks. This places the boiler in the least dangerous position and leaves room for a driver's seat, steering wheel, and controlling lever at one side of the boiler, giving the driver an unobstructed view ahead.



No. 718,213.

719,037. Speed Regulator for Generators.—George J. Pelstring, of Cincinnati, Ohio, and Henry G. Pelstring, of Covington, Ky. January 27, 1903. Filed September 2, 1902.

The invention relates to a speed governor for spark generators. The generator is driven from the engine through an intermediate friction wheel. This friction wheel has a central circumferential friction surface engaging with the flywheel rim, and beveled circumferential friction surfaces engaging with similarly beveled friction surfaces of two small wheels on the generator shaft. The outer one of these two wheels is free to slide on the shaft and is normally pressed against the intermediate friction wheel by a spring, while a centrifugal governor on the generator shaft forces this small wheel outwardly against the pressure of the spring when the speed exceeds that to which the spring has been adjusted, thus interrupting driving connections.



No. 719,037.

719,023. Vehicle Wheel.—Charles Miller, Binghamton, N. Y. January 27, 1903. Filed December 13, 1901.

719,293. Tire.—Edward A. Arcouet, Chicago, Ill. January 27. Filed April 2, 1901.

719,315. Storage Battery.—Claude H. Everett, Atlanta, Ga. January 27, 1903. Filed July 8, 1901.

719,326. Cooling Means for Explosive Engines.—Herman Gross, Lafayette, Ind. January 27, 1903. Filed November 14, 1902.

719,329. Vehicle Tire Fastener.—Jaques C. Haines, Chicago, Ill. January 27, 1903. Filed May 19, 1902.

THE HORSELESS AGE

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A general branch office of THE HORSELESS AGE for Great Britain and Continental Europe has been opened at the Imperial Building, Ludgate Circus, London, E. C. The office is in charge of H. V. Howard.

The Status of the American Automobile.

It is a notable fact that enthusiasm for the American automobile was considerably less pronounced after the recent New York Show than after the New York-Boston Endurance Contest last fall. At the recent discussion at the Automobile Club of America, for instance, all the speakers, with one or two exceptions, took the standpoint that Continental European automobile manufacturers were in advance of our own. A certain German machine particularly was held up as the present acme of perfection in automobile construction, and as the manufacturers of this particular machine seem to have difficulty in keeping up with orders one gentleman reasoned that if a machine of the same quality could be produced in this country and the tariff duty, transportation charges and agents' profits be saved, the company which put such a machine upon the market certainly would have rosy prospects. The conditions would be improved still further by the general acknowledged superiority of American manufacturing methods, which would enable the cost of production to be cut down.

Most comparisons between the relative state of advancement of the industry in this country and abroad are at fault in that a proper basis for comparison is lacking. It is overlooked that the American and European manufacturers do not produce for the same public. There are certain differences in the conditions which must guide the manufacturers here and abroad in their policy and determine the designs of vehicles. It is not so much the difference in roads, which is sometimes mentioned by superficial observers as an obstacle to the successful incorporation of French ideas in the design of American vehicles and to the success of French vehicles in this country. Road conditions may somewhat affect the practicability of running gear designs, but, on the other hand, a sparking plug that will spark efficiently and regularly on a smooth road will do the same on a rough road, and a carburetor that will maintain constancy of mixture proportions for all meteorological variations in France will also be independent of the weather in the United States.

The chief difference to be counted with is one relating to social conditions. Those who have lived in Continental Europe are aware that the middle classes over there, the so called petite bourgeoisie, are much less free with their money than people of about the same income in the United States. They spend it in lines established by tradition and become less easily interested in new sources of enjoyment. An American business man who has resided in Paris for many years stated the case very pointedly in a recent letter, in which he said: "The Frenchman will turn over the coin in his pocket many a time before he parts with it, but the American is not happy unless he can spend his money."

It is therefore only among the upper classes that the European manufacturer of automobiles can find an extensive market for his product, and the result of this condition is that all the more capable manufacturers in Europe are catering to the wants of the extremely wealthy, knowing that among them they will find a certain though limited market, and that this market will admit of comparatively large profits.

The social conditions affecting the introduction of the automobile are much more favorable in the United States, as much larger classes can be interested in it at present as a conveyance for both business and pleasure. Up to this time all the manufacturers who have done considerable business have pursued the policy of selling a vehicle of certain capabilities at the lowest possible price consistent with

the material and workmanship put into it —that is, giving the most for the money— rather than trying to establish a name for unsurpassed quality of their vehicles regardless of cost.

When the relative state of advancement of the art in Europe and America is to be compared the price of the vehicles should not be left out of consideration. The prices of touring cars built by the older and best known French makers —that is, the price asked abroad—is about twice as high as the price asked for cars of similar power built by some of the older American manufacturers. Now if these American manufacturers were to double their prices they certainly could add to their machines many refinements and improve their finish and the cars generally in a number of ways. The question is, Would it be a good policy to do this? Firms entering the manufacture of automobiles generally do so with the object of making money and not for the satisfaction of turning out the highest grade or most expensive machine possible. There will always be a class which will want what is nominally the best vehicle and are willing to pay a high price for it, but this class is small, and while at present the firms which have the reputation of producing the very highest grade of vehicles may do a flourishing business, the demand for this class of car is likely to fall off in proportion to the supply as more firms enter the field.

Those firms which work upon the principle of giving the public a good serviceable car at a reasonable price are likely to build up their business on a more substantial foundation; for the possible field for a really useful and reliable car is almost unlimited, and the demand for such machines should be no more dependent upon the sway of fashion than the demand for horses is at present. Looked at from this standpoint—that is, the quality of machine that may be obtained at a certain limited price—there is no question that the American manufacturers are even now ahead of their foreign rivals.

The Gordon Bennett Cup Race.

Never before has so much been written in either the daily or trade press regarding the preparations for the Gordon Bennett cup race as this year. Last year the whole affair was practically swallowed up in the Paris-Vienna race and only elicited separate notice after it had passed and it had become known that the cup had been wrested from the French by one of the English competitors. The cause of all the discussion this time is the difficulty the Automobile Club of Great Britain and Ireland is meeting in finding a suitable course satisfying the requirements of the cup contest rules, and the further difficulty it will undoubtedly meet in obtaining governmental sanction for the race after a suitable course has been found.

It seems to have been practically decided that Ireland offers the best opportunities to find a suitable course, as far as British territory is concerned. Exploration tours per automobile have been made on the island by a number of leading members of the Automobile Club, and a closed course about 150 kilometres in length has been selected and recommended for the race. Meanwhile the club is making every effort to favorably influence members of Parliament with regard to the race and a circular letter has been addressed by the president of the club to all the members of Parliament representing Irish constituents, asking them whether they would be willing to sign a petition to Parliament that a bill may be passed which would permit of holding the race in Ireland, provided that proper measures are taken for the safeguard of the public, and support the measure when it comes before Parliament. To this circular, we are informed, nearly all the Irish members have replied in the affirmative.

The club is further endeavoring to favorably influence public opinion, and among the arguments advanced as to how Great Britain would benefit from the cup race being held on British soil we find the following in the *Club Journal*, the pertinence of which may be open to doubt:

"If a number of people were engaged in endeavoring to introduce cocoanuts instead of meat as the staple food of the people of this country, could they wish for any better advertisement than a competition to be held in this country on a certain day, as to which of four big countries would place on a table at a certain spot the biggest and best cocoanut? If the cocoanut traders knew that if the competion were held in this country the newspapers would be full of it for weeks beforehand, that it would be attended by thousands of people, that it would attract attention to cocoanuts from people who had never thought of eating them before, surely they would use every effort to secure so valuable an advertisement of their wares."

France has shown itself to be quite eager to see the race run off on its own soil, and it has been intimated there that all efforts of the Automobile Club of Great Britain to obtain the sanction of Parliament for holding the race in British territory are bound to prove fruitless, and the English are simply trying to prevent the race from being held in France.

Double Acting Brakes.

We cannot agree with a statement made by Mr. Bickford, in another column, in which he claims that band brakes having the two opposite ends of the band fastened to lever arms of equal length cannot properly be called double acting brakes. His reasoning as to the effect upon the pressure of application of the friction between band and wheel is correct. With a brake of the type referred to the friction between band and wheel has no effect upon the average tension on the band for either direction of motion, provided the brake is adjusted correctly. The pressure of application of the band depends only on the pressure brought to bear upon the operating device by the driver. With a good size drum on the countershaft and a proper reduction of motion from the point of application of the driver's effort to the ends of the band such a brake can undoubtedly be made strong enough to slide the wheels. This particular form of band brake needs close adjustment, which is a disadvantage, but it is less liable to drag on the brake drum when not in use than some other forms of band brakes.

The N. A. A. M. and the Proposed Commercial Vehicle Trials.

It must have come as a surprise to many that the National Association of Automobile Manufacturers at its recent meeting disapproved of a trial of commercial goods vehicles being held in the spring under the auspices of the Automobile Club of America. The reasons for this decision of the association seem hard to find, especially since a number of the members of the committee which adopted the decision are representatives of firms which a short time ago were reported having indorsed the plan of holding such trials. The majority of the interests rep-

resented by the N. A. A. M. may have nothing to do with business automobiles at present and may therefore not feel any need for such a contest, but is it not right and proper that all the interests connected with the automobile movement should be given the advantage of the publicity which only a public trial can afford? A few of the manufacturers of delivery wagons and trucks are to all appearances well supplied with orders, but others who are just beginning the manufacture in quantities are meeting with the difficulties always encountered in starting in a new branch of industry. The business automobile may properly be said to be still in its infancy, and a series of practical trials would undoubtedly have done much to advance its cause. Of course, that the committee of the N. A. A. M. disapproves of the contest does not entirely bar it, but will certainly have a discouraging effect on the organizers. It would be quite desirable that the committee state what caused it to take this stand against such trials.

Some Notes on Brakes.

By J. V. S. Bickford.

The brakes on the various cars shown at the recent shows in England prove that there is a tendency to standardization in this matter. Almost every car nowadays has the same brake arrangements, differing only in details. Thus, the foot brake operates a band on one of the gear shafts, while the side brake wears a pair of bands on the brake drums of the back wheels. The most noteworthy point of difference is in the latter. Almost all the better cars have adopted the plan, first introduced, I believe, by Panhard, of making the pull on both brakes equal. The manufacturers of the cheaper cars, however, are content to allow matters to take care of themselves, but the plan cannot be recommended. This equalization is done as follows (Fig. 1):

A is the tube on which the brake handle is mounted and which also carries the two short levers B, which tighten the brake wires C. These wires lie over wooden pillows D, and after passing over this pillow the wire rope C is carried down and through a wooden thimble E set in the end of the brake tube. It then passes through

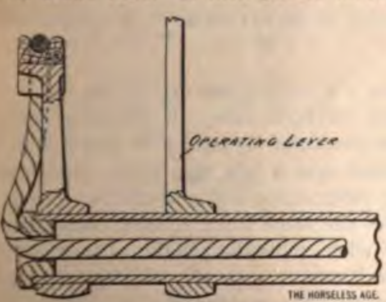


Fig. 1.

Fig. 2.

the tube to the other side of the car and up over the other brake lever, and so to the brake gear behind. By this means it will be seen that the tension must be equal on both brakes within a small amount. The objection to this plan is that the wires are said to wear rather badly, and I know from personal experience that steel wire is most nasty stuff to deal with. It is so springy that the moment the end wrapping is undone it all comes unwound, and when you come to do it up every strand is like a needle and pricks as badly.

There are other plans of equalizing the strain of the brake wires, one of which was recently published and is as follows (Fig. 2): On the top of the short brake levers A A are mounted two bell crank levers placed horizontally. The arms B B of these levers are connected together by an adjustable rod across the car, while the arms C C are connected to the brakes. It will be seen that this equalizes the strain on the two brakes. The objection to the apparatus is that if one brake wears considerably more than the other it is not possible to take up all the wear with one rod only, as it would throw the bell cranks too far out of truth. Two adjustments have therefore to be made.

I have recently seen a good deal of misleading literature about what is and what is not a double acting brake.

Fig. 3 shows a single acting brake, and for operation in one direction this is a most powerful device, while for the other direction its stopping power is practically nil. Fig. 4 shows what is often called a double acting brake, but which is nothing of the sort, unless equal inefficiency in both directions is to be called double action. The reason why the single acting brake will not stop the machinery when reversed is as follows: When a band brake is put on the tendency of the wheel is to carry it round with it. This increases the tension at the end, and the increased tension causes more friction, which again reacts on the tension, so that the effect is, so to speak, cumulative. All this accumulated effect acts on the other end of the brake band at B, which is a fixed point. The tension on B may be found from a table in Worby Beaumont's book on motors. It will therefore be seen that if 1 pound tension is applied at A the tension at B will probably be 3 pounds or more, but the only resistance to the hand lever which applies the brake will be that due to the 1 pound at A. But if now, instead of attaching B to a fixed point, we attach it to the other side of the short lever A, as at C, Fig. 4, it will

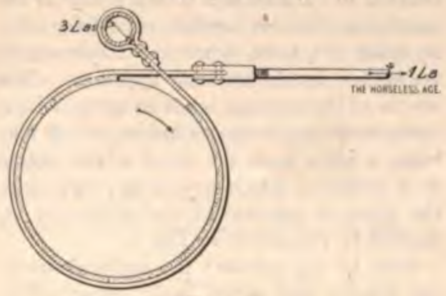


Fig. 3.

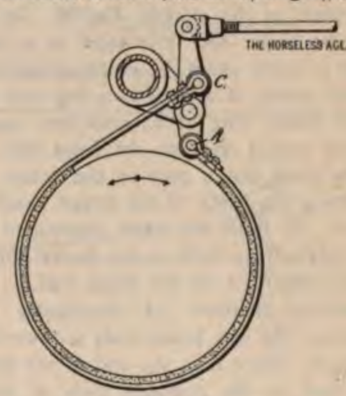


Fig. 4.

at once be seen that the tension due to B will tend to slack off the brake, and the hand lever has to resist the combined effect. In consequence the brake does not act strongly either way.

Fig. 5 shows a true double action brake, such as is fitted to almost all the best cars now built in Europe. Only a comparatively small part of the circumference of the brake ring is surrounded by the band, but the band is held in its middle part by a radius rod A starting from somewhere near the same part of the car frame as the radius rods of the back axle. By this

Fig. 5.

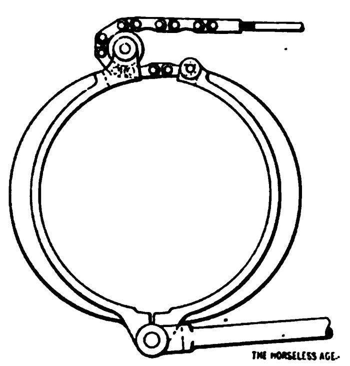


FIG. 6.

means the position of the point B does not vary with the springing of the car. The brake power is differently applied in different cars, but a useful form is shown in the sketch Fig. 5.

In one case, which came under my notice some time since, the two parts of the rear band brake were brought together, as illustrated in the sketch, Fig. 6. In this case the brake rod terminates in a short length of cycle chain A, which passes over a small pulley B attached to the rear half of the brake ring at C, and then passes forward and is fixed to the front half. It will be seen that a pull on the brake rod will bring the ends of the brake band together. In both the cases illustrated the pull on the rear half of the brake will be greater than that on the front half.

Another method of equalizing the strains on the two brake rods is illustrated in Fig. 7. Here A is the end of the brake cross rod, to the opposite ends of which are secured the two short levers B C, which tighten the brake rods themselves. Of course the brake handle is also keyed to the rod A. Each of the short levers B C carry at their upper ends small pulleys or smooth pegs, over which pass the short cycle chains in which the brake rods D terminate. These chains then pass down and are wound round a barrel on a second cross rod parallel to the rod A. If preferred the rod A might be hollow, and the other rod E might then pass through it. The chains on opposite sides are wound in the reverse directions round the barrels E F, as shown. It will now be clear that if the rod D is tightened by the movement of the pulley G the chain will tend to turn the barrel in the direction of the arrow. This will tighten the other chain, and in this way the strain will be equalized. Cycle chains of this sort are both cheap and strong, and are not liable to excessive wear. It would be necessary to provide something in the nature of a screw lanyard to take up the wear in the brakes. This could be done in the rod D.

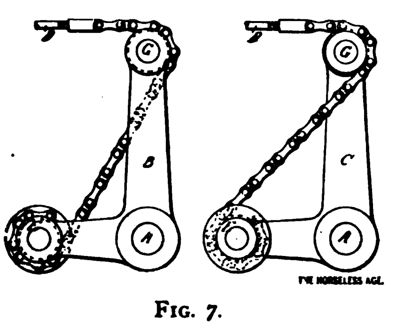


FIG. 7.

Care should also always be taken in fitting these brakes that a spring is introduced somewhere which will effectually slacken them when the pressure is taken off the brake lever, or they are apt to go on of themselves.

Some Considerations Relating to Skidding Due to Changing the Direction of Motion.

BY E. J. STODDARD.

Whether or not the saying "Science is measurement" is to be universally applied, it would seem that the sincere engineer would hardly feel satisfied that he was master of a subject until he could quantitatively predict results.

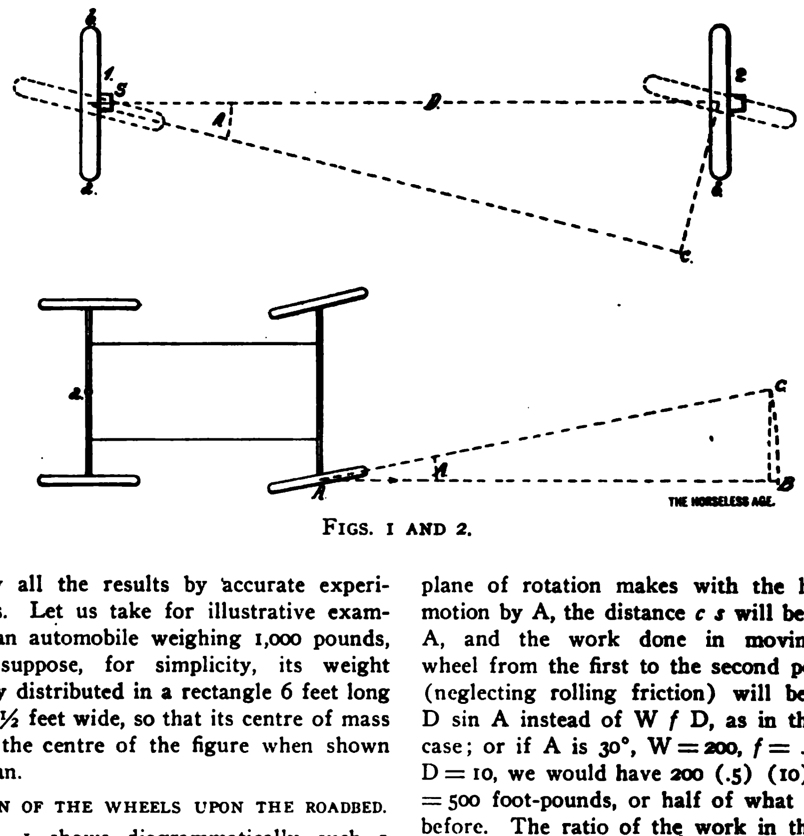
The writer will attempt to partly outline the subject of the above title, premising once for all that he has not been able to verify all the results by accurate experiments. Let us take for illustrative examples an automobile weighing 1,000 pounds, and suppose, for simplicity, its weight evenly distributed in a rectangle 6 feet long and 2½ feet wide, so that its centre of mass is at the centre of the figure when shown in plan.

ACTION OF THE WHEELS UPON THE ROADBED.

Fig. 1 shows diagrammatically such a vehicle which we will suppose to have been running in the direction of the arrow at the rate of 30 feet per second, or a little over 20 miles per hour, when the front wheels are turned by the steering apparatus. The inertia of the carriage tends to carry it right along in the same line as before, which may bring a force upon the front wheels acting in a direction which makes an angle with the plane of rotation of the wheels, as indicated by the arrow in Fig. 1.

Now let us consider the action between the ground and wheel under these conditions. Let *a b*, Fig. 2, represent a wheel free to turn about its axle S. Suppose we draw it from position 1 to position 2 in the line of its axle. It will slide along its roadbed without turning, resisting the motion by an amount equal to the product of its coefficient of friction and weight.

Let us suppose the weight upon the wheel to be 200 pounds and the coefficient of friction .5. The resistance to motion would then be $200 \times .5 = 100$ pounds. If the distance D from the first to the second position of the wheel is 10 feet, the work done would be $100 \times 10 = 1{,}000$ foot-pounds. Now suppose the wheel turned at an angle to the line of motion, as indicated by the dotted lines, and that it is again drawn over the same course; it will now both slide and roll, as does the record making wheel of a polar planimeter. Draw a straight line S *c* from the centre of the wheel in its plane of rotation, and a perpendicular line *c s* from the line S *c* to the centre of the wheel in its second position. In changing its position, the wheel will have rolled a distance S *c* and slid a distance *c s*. If we represent the angle the



FIGS. 1 AND 2.

plane of rotation makes with the line of motion by A, the distance *c s* will be D sin A, and the work done in moving the wheel from the first to the second position (neglecting rolling friction) will be W *f* D sin A instead of W *f* D, as in the first case; or if A is 30°, W = 200, *f* = .5, and D = 10, we would have 200 (.5) (10) (½) = 500 foot-pounds, or half of what it was before. The ratio of the work in the second to the work in the first case is

$$\frac{W f D \sin A}{W f D} = \sin A.$$

Now the wheel has moved the same distance in both cases; it therefore follows that the force necessary to move it in the second case is less than in the first case in the ratio of the work in the two cases. It takes the same force in both cases to make the wheel slide, but in the second case the wheel acts as a wedge or inclined plane to overcome the resistance of the roadbed.

The truth of the above principles may be

roughly verified by the following simple and easily adjusted apparatus:

Obtain a toy automobile having rubber tires and weighing about 2 pounds, such as are on sale in the market for about $1. Fix one leg of a pair of compasses at the centre and edge of a large drawing board, as at A, Fig. 3. Now tie a string toward one end of the toy, say at B, pass it around the compasses and back, and tie the other end toward the other end of the toy, say at C. Fasten a looped string D, so that it may be used to draw the toy along. By adjusting the lengths of the strands B A and A C, the toy may be held at any angle to its line of movement, and the force necessary to draw it may be measured by a small spring scale E. It will be found that the force necessary to produce motion is roughly inversely proportional to the angle between the line of motion and the plane of rotation of the wheels. It will also be noticed that although with a small angle but little force is applied, still the tendency to upset is quite as great, indicating that the force necessary to slide the tire is the same.

VELOCITY OF TURNING.

Returning now to Fig. 1, if the vehicle continued in the same straight line it would go a distance A B = V, or in the supposed case 30 feet in one second. If it went in the direction of the plane of rotation of the front wheels, these wheels would go a distance A C = V = 30 feet. That is, the front of the vehicle would be forced out of its line of motion with a velocity V sin A feet per second, A being the angle at which the wheels are turned.

This velocity once established is continuous, because as the front wheels move laterally they carry the front of the vehicle with them, turning the vehicle about a point *a* and continually increasing their angle with the original line of movement, though maintaining a constant angle with the instantaneous line of motion. The angular velocity with which the vehicle is turned is

$$\frac{\text{V sin A}}{\text{B}} \text{ radians per second,}$$

in which B is the wheel base or distance between the axles. The time it would take the vehicle to traverse an entire circle would be

$$\frac{2\pi}{\dfrac{\text{V sin A}}{\text{B}}} = \frac{2\pi\text{B}}{\text{V sin A}} \text{ seconds.}$$

The circumference of such a circle would be

$$\frac{2\pi\text{B}}{\text{V sin A}}\text{V} = \frac{2\pi\text{B}}{\text{sin A}}$$

and its radius would be

$$\frac{\dfrac{2\pi\text{B}}{\text{sin A}}}{2\pi} = \frac{\text{B}}{\text{sin A}}$$

Some of the above formulæ may be roughly verified by the above mentioned model or toy, as, for instance, by setting the wheels at a certain angle and observing the radius of the circle in which it turns.

In the supposed case, B = 6 feet. Suppose the wheels to be turned to an angle of 10°, of which the sine is about .174. It would take

$$\frac{2\pi 6}{30\,(.174)} = \frac{37.7}{5.22} = 7.22 \text{ seconds}$$

to complete the circle, and the radius of the circle would be

$$\frac{6}{.174} = 34.5 \text{ feet.}$$

It is to be observed that the velocity is that of the centre of gravity of the vehicle; that the outside wheel would have a little greater and the inside wheel a little smaller velocity; that the outside wheel would have a less angle than the inside one, so that the products of the angles and velocities would be the same, and that therefore in strictness the average angle should be taken for the value of A. The sines of the angles of the two wheels are inversely proportional to the circles in which they are moving.

FORCES CREATED.

It is not velocity, but the rate of change of velocity that measures the forces brought into play. So in the present case, so far as the turning alone is concerned, it is not the angle of the front wheels which creates the force, but the rate of change of such angle. There is, of course, the centrifugal force when the vehicle is turning at a steady rate that comes from the inertia of translation, but I do not wish to consider this at present, but to confine myself to the consideration of forces which arise solely from the creation of angular velocity or angular acceleration.

As the angular velocity is

$$\frac{\text{V sin A}}{\text{B}}$$

and as the acceleration is the rate at which velocity is generated, the latter would be

$$\frac{\text{V sin A}}{\text{B}\,t},$$

where t is the time in seconds in which the velocity is generated. As the torque is equal to the product of the angular acceleration and the rotational inertia I (see "Dynamics of Rotation," Worthington, Longmans & Co., page 17), the torque T would be

$$\text{T} = \frac{\text{I V sin A}}{\text{B}\,t}$$

and the force F exerted would be

$$\text{F} = \frac{\text{I V sin A}}{\text{B}^2\,t}.$$

The rotational inertia of a rectangular figure about its centre is one-third the sum of the squares of the perpendicular axes, multiplied by its mass.

In the case supposed and illustrated in Fig. 1,

$$\frac{\left(\frac{2.5}{2}\right)^2 + \left(\frac{6}{2}\right)^2}{3} 1000 = \frac{(1.25)^2 + 3^2}{3} 1000$$

$$= \left[\frac{1.25^2}{3} + 3\right] 1000 = (.5208 + 3]\, 1000$$

$$= 3520.8 \text{ pound} - \text{square foot units.}$$

But we want the rotational inertia about the parallel axis at *a*, which we know to be that about the centre of the figure plus the product of the square of distance (3 feet in this case), between the two axes and the entire mass, or $(3)^2\ 1000 = 9000$, so that the total rotational inertia about the point *a* is $9000 + 3521 = 12{,}521$ pound = square foot units.

Suppose the wheels to be turned to an angle of 11.5° +, the sine of which angle is .2, in half a second. We have B = 6, V = 30, sine A = .2, I = 12,521, and $t = \frac{1}{2}$. Substituting we have

$$\text{T} = \frac{12{,}521\,(30)\,.2}{6\,(\frac{1}{2})} = 12{,}521\,(2) = 25{,}042 \text{ statical foot poundals.}$$

or

$$\frac{25{,}042}{32} = 782.5 \text{ statical foot pounds.}$$

Dividing by the radius at which the force acts, or substituting in the equation for F, we have

$$\frac{782.5}{6} = 130.4 \text{ pounds.}$$

The final angular velocity is

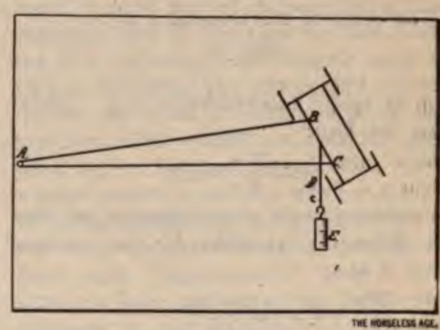


FIG. 3.

$$\frac{\text{V sin A}}{\text{B}} = \frac{30\,(.2)}{6} = 1 \text{ radian per second, or}$$

6 linear feet. The initial velocity is 0, and the average velocity

$$\frac{6+0}{2} = 3 \text{ feet per second,}$$

and as this has been acting for half a second it has moved the end of the carriage $3 \times \frac{1}{2} = 1.5$ foot.

The angular acceleration is

$$\frac{\text{V sin A}}{\text{B}\,t} = \frac{30\,(.2)}{6 \times \frac{1}{2}} = 2 \text{ radians per second,}$$

or 12 linear feet. The acceleration of the centre of mass at half the radius would be 6 linear feet per second. Now, as it takes one poundal of force to accelerate the centre of mass one foot per second, it would take 6 poundals to accelerate it 6 feet per second and $6 \times 1{,}000 = 6{,}000$ to accelerate 1,000 pounds 6 feet per second, or

$$\frac{6000}{32} = 187.5 \text{ pounds.}$$

But we have only 130.4 pounds acting at the front of the carriage, and the only other point at which a force could act to produce the effect is at the contact of the hind wheels with the ground. We therefore have a force of $187.5 - 130.4 = 57.1$ pounds

tending to skid the hind wheels, due to the force turning the carriage.

A more definite conception of the action is as follows:

For simplicity, let us represent the carriage by a line 6 feet long, weighing 1,000

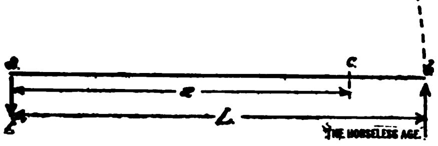


FIG. 4.

pounds (see Fig. 4), and consider the force applied at *b* to turn it around *a*. The problem is to find its reacting force at *a*.

Let M be the mass of the rod; L its length; *r* its angular acceleration. Take any element *c* of the rod at a distance *x* from *a*. This element resists its linear acceleration by some force *p*. The moment of this force about *b* is $p\,(L - x)$ and the reacting force at *a* is

$$\frac{p\,(L - x)}{L}.$$

The mass of the element *c* is

$$\frac{M\,dx}{L},$$

and its linear acceleration is $r\,x$. Therefore, the force

$$p = \frac{M\,r}{L} \times dx.$$

Substituting in the above equation, we have the differential equation for the reacting force F at *a*,

$$dF = \frac{\frac{M\,r}{L} \times dx\,(L - x)}{L}$$

$$= \frac{M\,r}{L^2}(L \times dx - x^2\,dx).$$

Integrating we have $F = \frac{M\,r}{L^2}\left(L\frac{x^2}{2} - \frac{x^3}{3}\right)$ which between the limits $x = o$ and $x = L$ gives us, after reducing,

$$F = M\,r\,\frac{L}{6} \text{ poundals or } \frac{M\,r\,L}{192} \text{ pounds.}$$

That is, the reacting force at *a* is equal to one-sixth the length of the line (wheel base) multiplied by the mass and by the angular acceleration.

Now substituting $M = 1000$, $r = 2$, $L = 6$, we get

$$F = \frac{1{,}000\,(2)\,(6)}{192} = 62.5 \text{ pounds,}$$

a slightly greater result than obtained above for the carriage, because of the difference in rotational inertia between the ideal straight rod and the supposed rectangle of the wagon.

THE REAR WHEELS.

Centrifugal force is a force due to inertia and is numerically equal to the acceleration of the mass toward the centre. If in the general equation for the centrifugal force

$$\frac{W\,V^2}{R},$$

or, if we wish the answer in pounds,

$$\frac{W\,V^2}{32\,R},$$

we substitute the expression for the radius in which the carriage is turning,

$$R = \frac{B}{\sin A}, \text{ we obtain } \frac{M\,V^2 \sin A}{B} \text{ or}$$

$$\frac{M\,V^2 \sin A}{32\,B},$$

in which M is now the weight upon the wheels considered.

The centripetal acceleration is proportional to the angular velocity about *a*, and this is evidently the rate at which the vehicle is being turned from its course. This angular velocity is

$$\frac{V \sin A}{B}.$$

To transform it to linear measure we should, it seems, multiply it by V, and to obtain the corresponding force we should multiply it by M, which gives us for the centripetal force

$$\frac{M\,V^2 \sin A}{B}$$

as before.

Let us represent the mass or weight on the back wheels by M_b, that on the front wheels by M_f, and the entire mass by M. The maximum force upon the wheels would be at the instant when the front wheels have reached their maximum angle with the centre line of the carriage. This would be for the front wheels

$$\frac{M_f\,V^2 \sin A}{B} + \frac{L\,V \sin A}{B^2\,t}$$

and for the rear wheels

$$\frac{M_b\,V^2 \sin A}{B} + M\,r\,\frac{B}{6} \text{ nearly}$$

in which *r* is the angular acceleration, as before.

If in the supposed case the weight on the rear wheels is 600 pounds, on the front wheels 400 pounds, $r = 2$, $\sin A = .2$, and $t = ½$, we should have

$$\frac{400\,(30^2)\,(.2)}{6} + \frac{12{,}521\,(30)\,(.2)}{6^2\,(½)} = 12{,}000$$

$$+ 4{,}174 = 16{,}174 = \text{poundals}$$

or

$$\frac{16{,}174}{32} = 505 \text{ pounds,}$$

and on the back wheels

$$\frac{600\,(30)^2\ .2}{6} + 1{,}000\,(2)\,\frac{6}{6} = 18{,}000 + 2{,}000$$

$$= 20{,}000 \text{ poundals}$$

or

$$\frac{20{,}000}{32} = 625 \text{ pounds.}$$

It is to be observed that the forces above calculated for the forward wheels are those perpendicular to the centre line of the carriage. To obtain the actual force in the axial line of the hub these should be divided by cos A, which in the above example would give

$$\frac{505}{.98} = 515 \text{ pounds.}$$

Owing to the obliquity of the action of the forces on the front wheels there would be a component acting to check the speed of the carriage, which would be equal to the force multiplied by sin A. This would create a force acting at an angle to the plane of rotation of the wheels. If the forces were the same upon both of the front wheels, because of the greater angle of the inner wheel, there would be created a torque tending to skid the rear wheels.

"Wer suchen will im wilden Tann
Manch' Waffenstück noch finden kann,
Ist mir zuviel gewesen."

Bridgeport A. C. Dedicates New Club Rooms.

The Bridgeport Automobile Club held a smoker in the new clubrooms at the automobile station on State street, Bridgeport, on Monday evening, February 2. About forty members were present, and the event was pronounced the most successful meeting since the club's formation, which dates back to September, 1900. The new club room, which was occupied for the first time, is handsomely furnished, with rich hangings in green and rugs of the same hue; it has steam heat and electric lights. A row of electric lights were burning in front of the station on this occasion.

President Charles C. Godfrey presided. In connection with the present legislative agitation in the State, it was decided that a committee from the club should appear at Hartford before the Committee on Public Safety in conjunction with representatives of other automobile interests. President Godfrey named the following to serve on the committee: Frank T. Staples, Thomas Fish, Dr. Dow R. Beebe, Gregory S. Bryan and A. McNeil, Jr.

The good roads committee was instructed to appear before the Board of Apportionment and urge the necessity of a liberal appropriation for good roads. The members were unanimous in the opinion that money should first be spent on the main thoroughfares, the streets that led out of town, so that continuous good roads should be provided, rather than patches of good roads here and there.

Reynold Janney, superintendent of the Locomobile Company, gave an address on the development of the automobile, at the conclusion of which a vote of thanks was rendered him. The rest of the evening was passed in discussing automobile experience.

A. C. A. Affairs.

On February 3 the club received a communication, dated January 20, from the Automobile Club of Great Britain and Ireland, outlining a course in Ireland for the Gordon Bennett cup race, and also a cablegram asking if July 9 would be satisfactory as a race day. The race committee by cable replied affirmatively as to the date and in detail by letter that the course specified would be agreeable. It is understood that this practically settles the matter, provided Parliament sanctions the race by law; otherwise that the French Automobile Club will be asked to take charge of it.

LESSONS OF THE ∴ ROAD ∴

Two Years' Experience with a Gasoline Carriage.

By J. H.

It was early in the spring of 1900 that the first symptoms of automobile fever began to manifest themselves with me. It seemed to be only a slight attack at first, but by the middle of the summer it had developed into a very serious case.

I collected and read carefully all the catalogues and other literature available on the subject, and finally made a trip to a neighboring city to investigate the merits of a new and wonderful invention that was to completely solve the horseless carriage problem and relegate the much abused equine to the bone yard and the glue factory. At any rate, that is the way the circular read, and I, in my anxiety to believe anything that was printed on the subject, spent a day's time and a little cash to have a look at the apparatus.

MEETING THE PROMOTER.

On arriving at the place where the machine was advertised to be on exhibition, I was directed to a small, dingy looking office, presided over by a fatherly looking old gentleman who smiled on me in a benign sort of way when I made known to him the nature of my errand.

I told him I had come to see the outfit described in the circular he had sent me, and which could be seen and tried at their salesroom. This seemed to stir the old man up, for he began a series of explanations as to why he would be unable to show me the machine that day.

The inventor, he said, was a very peculiar man, and very precise as to how everything in connection with the carriage worked, and in trying it a day or two before had decided to make a few changes before placing it before the public; these he assured me were of very trivial nature, and he would in a short time be able to show me the perfected machine, and so for the present I would have to content myself with a description of the motor which was to develop 5 horse power and weigh but 60 pounds; it was, he said, run by kerosene, at a trifling expense, and on an entirely new principle, being an internal combustion, rotary engine, of wonderful simplicity; and finally he told me in a confidential way that they had a few hundred shares of stock that could be purchased at a very low price then, which would soon be advanced to double the present figure.

This let a little light in on the subject; I began to realize what I was up against, and after assuring the aged promoter that stock was not what I wanted, I took my departure, and determined to wait until something further developed.

The "fever" subsided somewhat, and did not reappear until the winter of 1901, when a friend of mine handed me a copy of The Horseless Age to read. This only served to add fuel to the flames, and I was soon in correspondence with several manufacturers who had machines on the market, and finally arranged with the agent of one company making a steam carriage for an inspection and trial of his machine.

TRIAL OF A STEAMER.

After looking the outfit over and having things explained to me we started for a ride. Everything went along nicely, but we had gone only about 2 miles when we began to slow down. I looked at the steam gauge and found it had dropped from 180 pounds to 60 and was still going down. The agent looked troubled, and I felt sorry for him, for he had told me that this particular make of carriage was a fine steamer and no trouble at all to run or care for. He got out and pumped up the air, worked over the burner and made several adjustments, and by the time he had finished steam had dropped to 20 pounds. As we were ascending a slight incline the driver decided to run back, which we did, letting the machine coast until he got up a little steam, and by stopping three or four times in the last mile for this purpose, we managed to get back to the salesroom, where I bade the agent adieu without placing an order.

My experience with the steam carriage having proved so unsatisfactory, I decided to look up the gasoline type, for, having had considerable experience with stationary engines of this class, I did not regard them as being quite so much of a mystery as some of the steam carriage agents had pictured them. I found, however, that there were but few agencies for the heavy carriages, which seemed to be best adapted to my requirements, and these were in cities quite a distance away, so that I finally decided to try a second hand machine that was offered for sale. The owner, having gone to Europe, had placed his auto in a dealer's hands to be sold. It was of the heavy gasoline type with single cylinder engine of 8½ horse power, and steered by lever. On the trial trip it behaved very nicely, climbed all kinds of grades with ease, and seemed so much more powerful and reliable than the steamer I had tried that I finally traded for the machine, with the understanding that some minor repairs should be made, when I would come and run it home, a distance of about 75 miles.

THE FIRST LESSON.

In about a week I received word from the dealer that the carriage had been thoroughly overhauled and was ready for delivery. This was the latter part of the week, and so I planned to run home Sunday, in order that an expert might accompany me the entire distance. It was about 9 o'clock when I reported at the stable on Sunday morning and found that things were all in readiness for the trip. I spent some little time in looking the outfit over and getting information in regard to the operation and care of it, and at 9:30 a. m. we started on our homeward trip. It was a beautiful spring morning, bright and clear, and the roads were in fine condition. My friend, the expert, handled the levers until we reached the outskirts of the city, when he turned them over to me, and my first lesson in driving began. It was a good deal like trying to ride a bicycle for the first time—trolley cars and ice wagons seemed to have a strong attraction for me, and I had several narrow escapes from collisions, but with the expert's help I managed to get safely out of town and on the country road, where, with nothing to obstruct the way, things went along beautifully.

Our first stop was to be for dinner, which we expected to eat in Boston, about 50 miles from where we started, and by consulting our road book we found the most direct route was through Pawtucket, Attleboro, Norwood and Dedham. The roads were hard and dry the entire distance, a good part of the way being State highway, and by the time we had ridden the first 10 miles I had become quite expert in handling the clutch and steering levers, and when a clear stretch of road presented itself I could not resist the temptation to let her out a little. The engine worked perfectly, and the way we got over the road was quite a revelation to me, for my only country touring previously had been with "hay motors," and 8 or 9 miles an hour was about the limit, while reference to our watches and road book showed that we were making about 17 miles an hour.

We made our first stop at Dedham, where the machinery was inspected and the oil tanks filled, and were soon on our way again, and made no further stop until we reached the auto station in Boston, where we were to leave the machine while we were at lunch. We pulled into the place and immediately upon getting out were informed by one of the attendants that we had a flat tire. Our

TROUBLES HAD BEGUN.

We made several ineffectual attempts to pump up the injured tire, but it would not hold air, and as the repair shops were all closed, and there were no spare tires to be had, our trip, which started so auspiciously, was brought to a sudden end, 25 miles from our destination. This was not a pleasant prospect for a beginner, but there seemed to be no way out of the situation, so we decided to leave the carriage and have the tire repaired. Having become quite expert in handling the vehicle by this time, I concluded that I could run it home without assistance, and after a good dinner we parted company, I to return home, not, as I anticipated, the envy of my neighbors who were notified to be on the lookout for me, but the same as an ordinary mortal who

didn't own an automobile and had to be content with a trolley car.

I was told by the dealer where we left the carriage that it would be three or four days before the tire would be ready, and was somewhat surprised to receive a letter from him, two days later, stating that it could not be repaired, and that I would have to purchase a new one, which he could furnish for about $38. The old tire had been run quite a distance after being punctured and was badly rim cut. This was cheerful news, indeed, but then, if it was part of the game there was no use in kicking. But before being separated from the above sum I decided to look into the matter a little further, which resulted in my finding that the man in the auto stable had

SOME LITTLE GRIEVANCE

against the local agent of the company who made the tire and had taken it to another concern, which had pronounced it beyond repair. When I took the tire to the agents for that particular make, they said they could make it as good as ever at a cost of about $6.

The repairs were made, the tire put on, and a day or two later I invited a friend to come in to Boston and ride out with me. On being told that I was to drive the machine he demurred at first, but when I assured him that I was quite competent to navigate the outfit he consented. We settled up with the auto stable keeper, and before leaving for home we started out for a short ride around the suburbs. In attempting to throw in my high speed clutch, while the engine was running at slow speed, it stopped entirely. A little cranking got us under way again, and we sped along the boulevard blithely, all our trouble left behind us; at least that was the way it looked.

We had no particular destination in view, and so when a steam carriage whizzed by us we decided to follow, which we did for several miles, jogging along at about half speed, when suddenly, after coasting down a long hill, the engine slowed down and seemed to have very little power, and no amount of manipulating on the foot button controlling the speed had the least effect. We soon had the pleasure of seeing our friend in the steamer vanish in the distance, while we were unable to go much faster than a walk. I stopped the carriage and got out to look for the trouble, letting the engine run in the meantime. Suddenly it began to increase in speed, and without any apparent reason was soon going at its usual gait. This seemed mysterious at the time, but after this performance had been repeated a few times it dawned upon me that the trouble was due to an

EXCESS OF GASOLINE

in the carburetor, which gradually worked out and allowed the engine to get the proper mixture.

By the time things had got into good running condition we found, upon inquiry, that we were about 15 miles from Boston; we decided to return to the city, renew our supply of gasoline and oil, and start for home. After running 3 or 4 miles I chanced to look behind the carriage and noticed that we were leaving a dark trail behind us on the macadam; and upon stopping to investigate we found a good sized stream of water running down the pipe which connects the water tank with the engine. At first it seemed to come from the rubber hose used for a flexible connection between the two, but closer inspection proved the leak to be in the bottom of the tank, where the pipe was fastened to it.

Looking into the tank, we found it to be half full, and decided to replenish our stock at a nearby watering trough and trust to luck to get us back to the station, as neither of us knew how far it was safe to run without water. However, as the engine seemed to be working perfectly, we kept on and soon reached our starting point. An examination by the repair man brought us the information that it would take half a day to make the repairs, as it would be necessary to take the tank out to do the job, and this necessitated taking about everything in the carriage out, except the engine; the dismounting represented about three or four times as much labor as repairs on the tank did, and as Sunday was a very busy day with them they could not attend to it until the following day.

The thought of leaving that machine and returning home once more by train, with all the jollying I had to stand after my first experience, made me desperate. I decided I would

RUN HER HOME OR "BUST"

something, and I so advised my friend, who agreed with me that it would be better to water up at frequent intervals than face the music if we left the machine behind. We soon had on a new supply of oil, gasoline and water, and started out, leaving a tiny trail behind to mark our course. We made good time while running, but had to stop at every watering trough or pump to fill up, and formed some idea of what it meant to run a steam carriage, as we met several at different points along the route where we stopped for water, in most cases also engaged in renewing their supply. We soon got out into the country, where watering troughs were few and far between, and then our supply got so low that we had to stop and renew it from a brook some little distance from the road. As our only means of carrying the water was a small pail holding about a gallon, it was slow work, for it leaked out about as fast as we could supply it. We finally got the tank nearly full and started on, and by keeping up a good rate of speed we were able to reach a pump, where we took enough of the precious liquid aboard to land us in the stable at home, tired and hungry. And thus ended my first trip, which started the week before.

I was a little discouraged, but laid it all to hard luck; but when a day or two later I had taken out the leaky tank for repairs, I found that poor construction was the primary cause of the trouble, for the pipe that connected to the tank had simply been soldered in, and, being iron, had rusted around the surface and gradually broken away. I had the same piece put back in place, but in a short time had the same trouble. I then replaced it with a piece of brass pipe, and have had no further annoyance from this source, although the tank itself sprung a leak once just as I was about to start on a trip. I had to abandon the trip, don a pair of overalls and spend several hours in repairing the leak, but as it has been run a good many miles since without trouble I am led to believe that it is in better condition than when I got it. But this little oversight on the part of the builders caused me considerable annoyance, and I have no doubt that other users of the same make of carriage have had similar experiences.

FAULTY BRAKE ARRANGEMENT.

As the repairs to the tank had taken well into the week, I thought best to wait until Sunday before making my next trip. In spite of my troubles I was full of enthusiasm, for when everything worked smoothly it was royal sport. Sunday dawned bright and clear, and I invited one of my neighbors to take a ride with me, as my wife, to whom I suggested a ride, declined to take any chances until I had become a little more proficient in the management of the machine. So my friend and I started out of the stable. As there was not room enough to turn in the stable we backed out and down a slight incline, and as the carriage developed considerable speed I attempted to check it by applying the foot brake; but for some reason it had no effect on the carriage, and before I could apply the emergency brake we had knocked a picket fence belonging to one of my neighbors several inches out of line. After getting into the road I applied the brake and found it to work perfectly. A little experimenting later on developed the fact that, owing to the distance between the rear wheels and the point where the brake lever was fastened being lessened when the carriage was backing, the brake cable was too long to bring any pressure on the brakes when running backward, while when running ahead there was no trouble. This defect I later remedied by putting distance rods from the rear axles to the frame supporting the body; this took the driving strain from the springs, and I had no further trouble from that source.

We started for our ride, and as this was the first heavy machine here of the gasoline type we attracted as much attention as a small sized circus, and drew about as large an audience whenever we stopped. The small boy was much in evidence, and such remarks as "Get onto de road roller" and "Hully chee, whater noise" were fre-

y wafted to our ears, but we were r business and were soon in the sub- on our way to a neighboring town, in attempting to avoid running over broken stone spread on a piece of ndergoing repairs I ran too far into tter. Before I realized what was up ar wheels had sunk in the soft earth hubs, the engine gave a few spas- kicks and stopped and we

WERE ANCHORED.

rew out the clutch and started the , but after several attempts found that itch would not hold to pull out, for gine ran without slowing down much. I ied up my slow speed and backing es, while my friend procured a few from a nearby fence. In the mean- everal teams came along, one of them by an acquaintance. Such sugges- as "Get a derrick" and "Go hire a ' were hurled at us, but, nothing d, we kept at our task, and by work- e pieces of board into the soft earth h the wheels we were enabled to see gine back out of the gutter and onto ground again. A careful inspection to reveal any damage done, and we ued our trip. The engine behaved ully and proved its ability to pull us a tight place when necessary. We ith no further mishaps until nearly when there was a sudden grinding and a momentary slowing down. stopping to investigate, I found that ake wheel upon the rear countershaft orked off the shaft and caught against dy frame. The key had worked out, ere being no other means of holding place, we took it off and depended the emergency brake for the rest of p.

ew wheel was made to replace the old aving two set screws in addition to y, and has caused no further trouble. amination of the carriage after reach- ne stable showed that one of the used to support the frame of the had been broken, probably due to the it was subjected to in our gutter e.

frequency with which my troubles oming impressed upon me the neces- f a careful overhauling of the outfit, seemed impossible to go for a ride it a mishap of some sort, which in- d somewhat with my peace of mind. found after my first experience that of overalls and jumper were a very ary part of my outfit, as it was not it to explore the interior of a full automobile with one's Sunday on. The auto was accordingly put ne stable, there to stay until I had a few repairs and alterations that I necessary and of which I will write

(To be continued.)

Italian Automobile Club, of Flor- s organizing a second annual race.

A Physician's Experience with an Automobile in the Berkshire Hills.

By W. S. Carr, M. D.

During the summer of 1901 I became inoculated by the germ of automobiling and the severity of the attack admitted of no question as to the accuracy of the diagnosis. Consequently in November of that year I purchased a steam runabout. For extras I had it equipped with mud fenders, a Kelley generator, steam air pump, a small lamp to illuminate the water gauge glass at night, and had substituted surrey wheels for the lighter grade then used on light carriages. These extras I will refer to later.

As the season was far advanced and the roads already in bad condition I housed my machine and pocketed my impatience for the winter.

My spare moments were spent in making a thorough study of its mechanism and becoming conversant with all the details of its management. I had become convinced by reading the experiences of others that many accidents and failures were caused by ignorance of mechanical detail.

April 1, our roads being in fairly good condition, I received one day's instruction in the technic of firing up, etc., and became, as I thought, a full fledged automobilist, and from that day forth "paddled my own canoe."

2,500 UNEVENTFUL MILES.

For the next seven months I did all my professional work with it, which before had required the use of two and sometimes three horses. I disposed of my horses, burned my bridges behind me and burned gasoline under me to carry me about one of the most hilly towns in the State of Massachusetts. During these seven months I was obliged to patronize a livery stable for only three or four half days while slight repairs were being made. My odometer recorded 2,500 miles traversed and on all occasions, by night or day, I returned to my office propelled by the same power that took me out. I do not make these statements in a spirit of boasting, but merely to demonstrate what can be done with a steam machine in a hilly country, provided proper precautions are exercised in the care and handling of the machine. I proved, to my own satisfaction at least, that a steam runabout is practical and particularly adapted to the needs of a physician, being a cheaper, quicker and a more convenient mode of locomotion than horses. It can be kept in constant readiness for emergency calls and requires much less care.

MY LIST OF ACCIDENTS

is short, and nearly all of them could have been avoided by a more thorough inspection before starting out each morning. They consisted of two punctured tires, a broken chain, broken water gauge glasses, reverse lever flying back while ascending a steep, stony hill, and bursting of rubber exhaust pipe leading from cylinders. A few of the practical lessons I learned from these little mishaps I will relate for the benefit of beginners who may be located as I was, far from automobile repair shops and experts in that line of work. Punctures and broken water gauge glasses are usually unavoidable and easily remedied. My broken chain was caused primarily by allowing it to become too loose, thereby slipping off the sprocket and becoming jammed in the engine. The bursting of the exhaust pipe was a clear case of "wear out" and did no damage, aside from enveloping me in a cloud of steam.

THAT REVERSE LEVER AGAIN.

But my experience with the reverse lever was anything but pleasant and contained all the elements for a disastrous finale under any but the most favorable surroundings. While ascending a very steep, stony hill my reverse lever jarred back. As my steam gauge registered 220 pounds pressure and with the throttle pretty well opened it is easy to imagine the rapidity with which I started to descend. Although I immediately shut off the throttle, applied the foot brake and with the steering lever cramped and backed around into a friendly dooryard, by the time I could secure the truant reverse lever to its former position and stop my machine I had traversed fully fifty yards. On inspection I found the spring had become straightened enough to allow the lever to glide out of its notch.

Poor gasoline will in time corrode the wire gauze strainer and cause the fire to burn low. On the first sign of failure the gauze should be replaced before it becomes so corroded as to require being drilled out.

EXTRAS.

In regard to the few extras mentioned above I consider all of them indispensable. The fenders protect the occupants from mud, dust and small stones and save a great deal of labor in keeping the body of the carriage clean. The so called surrey wheels, I believe, are put on all runabouts of recent manufacture.

The water gauge lamp is an absolute necessity for night work. The steam air pump is also a necessity, saving both time and muscle, and can easily be used for inflating the tires as well. But of all the extras I consider the generator and pilot light the most valuable adjunct for a physician's use. Its advantages over the torch for firing up are incalculable, being much quicker and more convenient.

My common practice while making my calls is to turn out the main burner and leave the pilot light burning. This keeps the gasoline vaporized in the pipe and holds the steam pressure up to a point where upon opening the main burner again at the conclusion of my call I will have sufficient pressure to proceed as soon as I please. The pilot can be left burning

indefinitely at very little expense, thereby keeping the machine ready for immediate use. One more improvement I propose to add is an auxiliary steam water pump for use on very long hills. I can suggest a few changes in the general makeup of a machine for physicians' use, among which would be a larger gasoline tank (mine contains 5 gallons), a longer wheel base to insure more ease in riding as well as to provide more carrying space. Puncture proof tires of smaller diameter, I believe, would also be superior in the mud, sand and ruts found on our country roads.

How to Diagnose and Cure Some Diseases of the Gasoline Automobile.

By Dr. Frank A. Glasgow.

After several years' study of gas and gasoline engines, and also reading The Horseless Age, I decided that a steam auto was the only practicable vehicle for a doctor.

I bought one, and, although I paid a good price for it, I was never able to get a set of printed directions how to run it and care for it. However, as I knew the construction of the machine, I thought I could manage it. A man may be perfectly competent to manage an old family horse, but he is up against it when he has a bucking broncho intrusted to his care. My machine could give points to any broncho that ever lived.

My experience with this machine was very active from May until November, 1901, but very passive since then, as I have had it out probably four times since.

I do not believe that I exaggerate when I say that it cost me about $10 a ride, besides causing me to probably lose my expectation of future bliss. I learned a great deal about machinery, and had plenty of exercise working the hand and air pumps. I also found out how little you can trust an automobile repairer, either to make honest repairs or render an honest bill. Plumbers do not stand in the same class.

But others have had this same experience, and my object in writing is to bring before the public, and especially those purchasers who have yet to get their experience, things that they ought to know beforehand, and not learn by sad experience.

Besides the printed description and directions how to manipulate, there should also go with each machine a list of the accidents or diseases of the animal, and directions how to diagnose or find out what "ails the crittur." My experience is that the user learns after experience to diagnose the ailments far better than the mechanics.

TURNS TO GASOLINE.

The list of mishaps to a steam machine such as I have had are too numerous for me to enumerate. I decided last May that it was impossible to get any practical use out of my steam carriage, so I bought a gasoline machine. I have been using this daily, with few interruptions, since last May.

I believe that I average 25 to 30 miles a day, and depend entirely on this one machine.

There are two other physicians nearby using gasoline carriages (and these happen to be of the same make), who are depending altogether on them for their practice. One of these tells me that he makes 40 or 50 miles a day. This doctor had three carriages before getting this gasoline, two steam and one gasoline, and he is now satisfied.

One point that all beginners should recollect is that nine times out of ten when an engine refuses to work it is some little thing which is at fault, some lack of proper adjustment. This he can set right in a very few minutes if he knows where it is. This knowledge I believe I have mastered, through experience and instruction of the makers, fairly well. If the engine stops, first turn the crank slowly to see if the buzzer works. If it does not the vibrator needs regulating or cleaning. To facilitate finding where the crank ought to be when the primary current is closed you should make a mark on the flywheel when the buzzer is working. Putting this mark in the same place when the buzzer does not work, you can adjust it readily. If when you have placed this mark in the right place you cannot make the buzzer work, then you know that the trouble is in the primary circuit, probably in the interrupter or commutator. If your sparking plug gets covered with soot and refuses to work, you will have to remove this and clean it with sandpaper. Do not use a knife blade or metal for this purpose. This sooting is an evidence of too much lubricating oil in your cylinder. This may come either from a too free feed from your oil cup or from an excess of oil in your crank shaft.

This latter oil is splashed up against the piston head and sucked in.

This oil from the crank shaft, as it is generally a low grade oil, will get charred in the cylinder, and coating the walls will cause a roughness, heating and early firing.

This early firing causes pounding, or sledge hammer like blows in the machine. If this has occurred, and is not due to the spark being too early, which may also cause it, you had better get your cylinder scraped out. I have heard that the use of coal oil for a few minutes at a time in your oil feed will clean out the cylinder This should probably be done occasionally, say, once a month. When the pounding is bad the coal oil will not cure it. I have had to have my cylinder scraped because of poor oil being used in it. From what I can learn thick oils and oils with an asphaltum base are not suitable for use in the cylinder. A thin, greenish oil seems to give satisfaction. The regulation of the proper amount of oil is a difficult problem. A drop every one or two minutes is probably enough. When the oiler is once properly adjusted it ought not to be disturbed. This has given me more trouble than anything else about the carriage. If your engine runs well for a few minutes after flooding the carburetor, then stops, you may be sure that your gasoline supply is too limited or the opening for the gasoline may be plugged.

If the engine runs for a variable time, probably your inlet valve may be sticking. In my machine this can be watched while the crank is turned. In turning the crank always keep away from it, so that if it should fly back you will not be injured. Sometimes the accelerator button sticks and so holds your spark advanced. Of course, one should see that his battery connections are perfect and test them by connecting the terminals.

DRY BATTERIES.

I have experimented with a used up dry cell battery and found out that a theory that I had, viz., that they were dried out and not used up, is sometimes correct. I bored holes down into each cell and poured in water for ten or fifteen minutes until it was not readily absorbed. This battery gave me three weeks more service. This may help someone out of a difficulty when he cannot get new batteries.

ONE MACHINE ENOUGH.

A year or so ago I read that a doctor would need two or three machines in order to have one always ready for use. After learning the above diseases, how to diagnose and cure them promptly, I can say from personal experience that this is not true. Perhaps I am fortunate in having a good machine, made to stand hard usage, and fortunate also in having the makers in my own city. I cannot act as a machinist, as I have to keep my hands fit for surgical work. I find now that it is possible to run a gasoline carriage from early morning until late at night without doing machinist duties. I have no chauffeur.

I never expect to go back to horses. My experience is that a good gasoline carriage, costing about $1,200 and weighing 1,500 pounds, will cost as much to keep in a livery stable as a horse, viz., $20 a month. To this must be added $5 to $10 per month for legitimate repairs and tires. If kept at home it will cost much less. This will do the work of three horses and save you much valuable time also. To this must be added the pleasure of suburban trips.

Experience of a Country Doctor.

By H. B. Hart, M. D.

Having to keep two horses in my country practice the question of reducing expense by operating an automobile appealed to me, and it is about a year since I purchased my first carriage—a heavy gasoline phaeton. This I quickly found unsuitable and turned to the light steam runabout, which is giving me perfect satisfaction.

Locality, roads, accessibility to repair shops must all be considered in choosing motive power, and I will state briefly the conditions I find and what seems to meet them.

THE ROADS

in my vicinity are very good and very bad, a piece of finely macadamized State highway extending east and west to neighboring villages, while off from this very sandy roads are met. These my gasoline rig could only take on the low speed, making hard work, while the steamer runs along without effort. The State road, which is ideal for the motorist, is hard on the horse, spoiling good drivers and wearing out shoes and carriages, but on this kind of road any make of automobile will do well. On the other kinds of road, unless one has a high powered car, the steamer seems to do better, having a reserve force for hard places. Again,

NERVOUS HORSES

are less frightened by the noiseless steamer than by the explosive motor when stopping the carriage without stopping the motor. A stranger may push along, but in your own neighborhood it pays to be pretty considerate of the driving public. In all my driving I have not seen an accident or more than two or three frightened horses, while a friend who owns a small gasoline runabout caused a serious accident in spite of his care.

The repair question must be considered. The gasoline motor when running will leave little to be desired, but when it balks, as it surely will at times, it will require a search for the trouble, making the services of an expert desirable, while the steamer quickly shows where the trouble is. In the country where no repair shop can be reached for minor troubles, as in my case, this is important, although so far I have had no occasion to call in help. The steam engine is more easily understood and seems to cause less trouble.

My carriage is a standard steamer, single seated, weighing only 600 pounds, with a radius of 40 to 50 miles on a tank of gasoline and 23 to 25 miles on a tank of water. In using it for professional calls, standing with steam up and firing up several times daily, 7 to 8 miles to a gallon of gasoline is all I expect. On a long run I can figure on between 10 and 11 miles to the gallon. The gasoline costs me 16 cents a gallon; $5 would cover my bill for lubricating oil, waste, new spokes and repairs, and 3 cents a mile would more than pay for the distance run.

While I could undoubtedly do all my business through the warm months with the automobile, frankly I should not care to. For night driving, for rainy weather, and for bad roads I prefer a horse, but for the long rides which I frequently take (30 or 40 miles a day) I must say the automobile has a place of its own, excelling both in speed and restfulness, and to a doctor who will use one in this way, realizing that the machine needs intelligent care, the matter of expense does not compare with the comfort derived. And to those located as I am, away from repairer's expert advice, I advise the selection of the steam carriage.

Three Years' Hill Climbing with Both Steam and Gasoline.

By Dr. L. S. Colter.

To one familiar with the topography of Cincinnati and vicinity the question as to the practicability of the automobile is of special interest. To those who have never visited Cincinnati the writer suggests that they imagine the business portion of the city proper as located in the bottom of a natural basin, and surrounded on all sides, except the Ohio River side, by exceedingly steep and long hills leading to the resident portion of the city, or, as it is called here, "The Hill Tops." Indeed so steep are many of these hills that for years the street car companies of Cincinnati have made use of what are known as inclined planes, operated by steam, and which are in fact steam elevators, which lift the cars to the tops of many of these hills. A physician who visits patients upon these hills must of necessity climb many steep grades, and often grades that are a mile or more long, and with many sharp turns. The writer's experience in the use of automobiles has for the most part been in ascending and descending these hills in making his professional calls.

For the past three years he has used an automobile in making these professional calls, and believes that he has long since passed the experimental stage, and has reached the point where he can say without a doubt that the automobile is in every way more satisfactory than the horse, saving much valuable time and doing work that would often be beyond the endurance of two horses, and at a cost much below that of keeping one horse.

A QUADRICYCLE FIRST.

His first experience was with a gasoline quadricycle, which he used fairly satisfactorily as long as the weather was good, but soon found that while a machine of this type served to take one over the ground in fairly good shape when the weather was good, as soon as cold weather approached it had to be discarded because of the exposed condition of the rider.

STEAM NEXT.

He then purchased a steam machine, which he used with good success for about eighteen months. This he found very serviceable. It would climb any of our hills with comparative ease, but because of the fact that the work was always very heavy and the machine a little too light in its vital parts he found it going to the shop for repairs too often. There was also some trouble experienced in operating it in extreme cold weather, because of the water freezing in the smaller pipes.

AN 8 HORSE POWER GASOLINE MACHINE.

The third and last venture has been a single cylinder, 8 horse power gasoline machine, and with this machine the most satisfactory results have been experienced. After six months' use he has no hesitation in pronouncing it an unqualified success in every way. During this period of time the crank has never been turned without getting an immediate explosion in the cylinder. The spark plug has never had to be removed to clean or inspect it; the dry cell batteries have always furnished the proper spark; there has never been a stroke of work done on the motor or any of its connections, with the single exception of the circulating pump, which was twisted out of place recently by attempting to start the motor when the pump was frozen after standing all night in a cold barn. The machine has never been out of use for a single day in these six months. It has never balked and has never been towed home. There have been some tire troubles, but what machine has not had them? This machine has had some very rough use, but has been

WELL TAKEN CARE OF.

Upon this last point the writer believes the satisfactory use of an automobile depends. This machine is well cleaned every day, and every nut and screw inspected and kept tight. By giving the automobile half the attention a horse would require it is kept in perfect working order.

RECOMMENDED FOR ANY PHYSICIAN.

After three years' experience in the use of an automobile the writer feels satisfied that any physician in any locality will be able to use an automobile with perfect success in his professional work if he will first get the right machine, and, second, give it the right kind of care. While the writer knows of some physicians who have tried the automobile, and disgusted have finally abandoned its use, yet he is sure that in every case the fault has largely been their own. They have either used bad judgment in the selection of the machine, or, if fortunate enough to have purchased a good machine (and there are good ones), they have expected the machine to do their work and receive little or no attention from them. Under such circumstances disappointment is sure to come.

It might be said that because the writer has had three automobiles in as many years surely they have not been very successful. In reply he would say that he had to gain his experience unaided. When the first machine was purchased there were none in this locality. But the first machine was a good machine of its kind and would run, but was not adapted for a physician's work in all kinds of weather, as was afterward discovered. The second machine never caused a single appointment to be missed, nor did it get there late, and it is still today in good working order. In eighteen months its boiler was never scorched, nor was it towed home. It was an improvement over the first machine, but the present machine is a further improvement, and at present meets all the requirements of a busy physician, and the writer would feel hopelessly lost without it.

BEGINNERS PAGE.

The Storage Battery.

The storage battery is an apparatus which will absorb electrical energy, transform it into and store it as chemical potential energy, and deliver it again on demand in the form of electrical energy. A part of the energy absorbed by the battery is necessarily lost in the process of double transformation.

A storage battery consists of a number of storage cells. For purposes of illustration of the principle a simple storage cell may be made as follows:

A couple of lead plates are suspended in a glass or hard rubber vessel containing a dilute solution of sulphuric acid. The plates are suspended from an insulating support. If this cell is connected into an electric circuit so that a current passes through it from plate to plate, it will be found upon disconnecting the wires and connecting an electric indicating instrument to the plates that the cell has acquired the property of giving out a current, which is indicated by the instrument. It will also be noticed that the current given out by the cell flows through it in the opposite direction as the original or charging current.

If the two plates be lifted from the sulphuric acid solution after the charging current has been passing through the cell for some time, it will be found that one of the plates is of much darker color than the other one. The dark plate is called the positive plate and the dark color is due to a layer of lead peroxide over the surface of the plate, which has been formed, by the passage of the current, from the lead of the plate and the oxygen of the acid solution.

The simple device just described combines all the elements of the storage cell as used on electric automobiles. The plates are called the electrodes (positive and negative respectively) and the acid solution is called the electrolyte. The retaining vessel of storage cells for vehicle use is usually made of hard rubber. In electrical literature it is usual to indicate the positive electrode and positive terminals by a + sign and the negative electrode or terminal by a — sign.

If the simple storage cell above described be allowed to discharge the energy it has accumulated, and then be recharged, and if this process be repeated quite a number of times, the capacity for storing energy will gradually increase with each succeeding charge, but it will always be much too small to make the cell practicable for automobile purposes. The effect of the charging current is to form lead peroxide on the positive electrode and spongy lead on the negative electrode. The lead peroxide and spongy lead are called the active materials, and the lead plate itself simply serves as a support for these active materials. To improve the battery the proportion of the active material to the material contained in the support must be increased, and this is accomplished by two different methods.

PLANTE ELECTRODES.

The first of these two methods consists in plowing up or "spinning" the surface of the lead plate, so that the amount of surface exposed to the action of the electrolyte is greatly increased. A plate of this form is illustrated in Fig. 1. Most manufacturers form the plates with the plowed up strips making an acute angle with the plate itself, as shown in the illustration. The object of this construction is to prevent disintegration of the electrodes, by charging and discharging. When the battery is being charged the active material expands, and if the strips were perpendicular to the plate surface the entire active mass would have a tendency to buckle and break off from the supporting plate. When the strips are arranged to make an acute angle with the plate this angle will slightly increase as the active material expands in charging, and thereby make room to allow for the expansion.

After the surface has been thus plowed up the plate is subjected to treatment with some disintegrating chemical, such as nitric acid, which renders its surface porous. Then all traces of this chemical are washed from the plates, and the latter are assembled in a cell containing a sulphuric acid electrolyte, and are subjected to a series of charges and discharges, a process called "forming" the electrodes. This particular method of constructing the electrodes (of nothing but sheet lead) is called the Planté process.

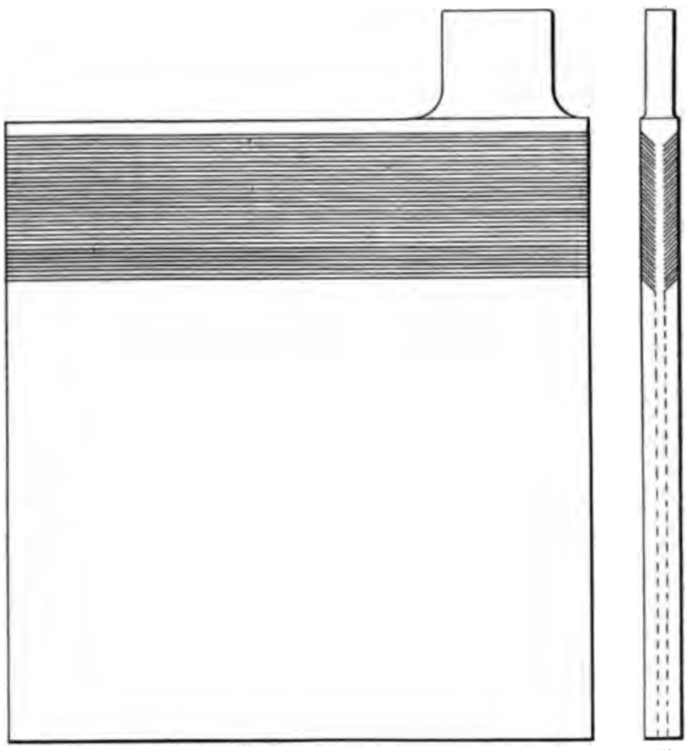


FIG. 1.

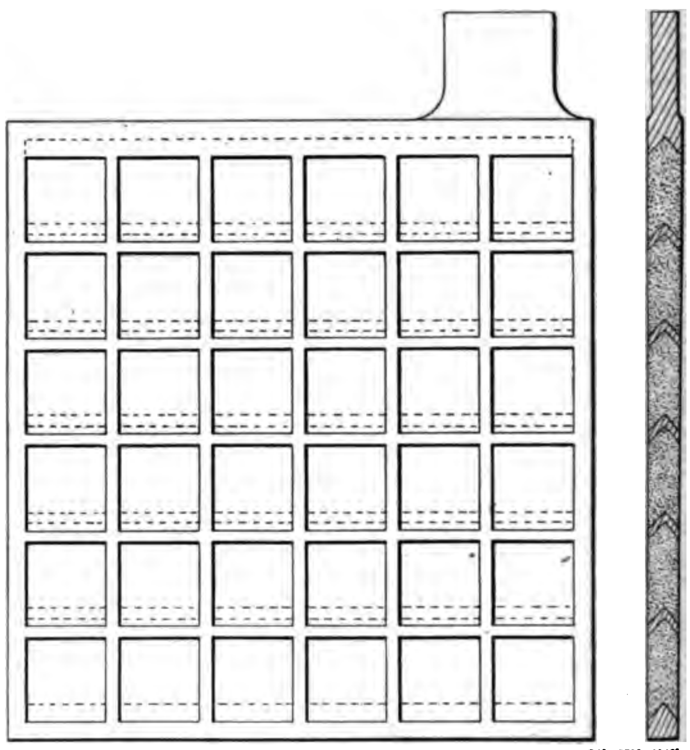


FIG. 2.

FAURE ELECTRODES.

Another method of constructing storage battery electrodes consists in making grids of lead (by a stamping or casting process), and then filling the openings in these grids with a paste composed of a lead salt and dilute sulphuric acid. The paste for the positive plates is made of red lead (or minium) and acid solution, and the paste

negative plates of litharge and acid
. Some of the manufacturers add
e pastes a binding agent to make
nore coherent. The grids vary in
ith the different manufacturers, but
e always constructed with a view
ining the greatest possible strength
e least material, and to retain the
material most securely. One par-
form of grid is shown in Fig. 2.
ss bars of the grid are made of V
securely hold the pellets of active
l in place.

plates are made rectangular in form
h a connecting lug projecting up-
om their upper edge near one cor-
ny number of plates may be used
l, plates of opposite sign being ar-
alternately—i. e., a positive plate
between two negative plates. The
ntain as a rule an uneven number
s, one more negative than positive
nd the two outer plates are always
es. The reason for using one more
e plate is as follows:

hemical action during charging and
ging is accompanied by mechanical
f expansion and contraction. These
ical effects are far more pronounced
positive plate than in the negative.
sitive plate was the outside one the
ion would be unequal on its two
owing to there being no negative
e its outer surface, and the plate
warp or buckle, resulting in its early
tion. All the positive plates are
ally connected with each other, and
negatives are similarly connected, by
ars of lead uniting the upwardly ex-
g lugs of all the plates of like sign.
ates are so assembled that the lugs
positives are all on one side of the
d the lugs on the negatives all on
er side of the cell. This is shown
illustration, Fig. 3.

permit of adjacent electrode plates
brought close to each other without
of contact between their parts (a
nenon called short circuit) separa-
re generally used, composed of a
f perforated celluloid, of asbestos or
material. These separators are in-
between each pair of plates. The
re closed on top with a cover of
ubber or of some resinous com-
which is put in place in the molten
Through this cover project lead
om the two cross bars mentioned, to
e terminals of the cell to make con-
by. The cover is provided with a
opening formed by an internally
d hard rubber bushing. Into this
g is screwed a tip of hard rubber
very small hole through it to serve
nt.

containing vessels or cells are made
ansverse ridges on the bottom sur-
the inside, upon which the plates
Any active material dropping from
tes will collect in the space between
dges and below the plates, and thus
...it the plates.

The electromotive force of a storage cell varies somewhat with the state of charge. When the cell is completely charged it will show nearly 2.5 volts. As soon as the discharge is begun the voltage rapidly drops to 2.2, at which it practically remains during the greater part of the time of discharge. When the charge is nearly depleted the voltage begins to drop again, and the discharge should never be continued below an electromotive force of 1.8 volts, as that is injurious to the cell.

The current which may safely be drawn from a battery depends upon the area of the electrodes and upon their mechanical construction. Three hours is usually calculated on as the normal time of discharge. It is, of course, self evident that the greater the current taken from the cell the sooner

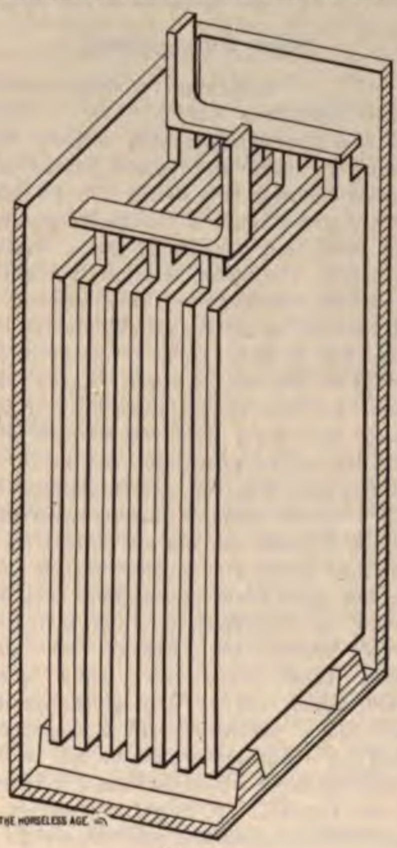


Fig. 3.

the charge will be run out. The product of the current (in amperes) into the time of discharge (in hours) is called the capacity of the cell and is expressed in ampere hours. The capacity varies with the rate of discharge and is smaller for a high rate of discharge than for a slow one. It has become customary to specify the capacity of a storage cell on the basis of a four hour discharge.

The reason that the cell must not be discharged too rapidly is that with too strong a current the chemical actions in the plates are very violent, and the plates are subjected to undue mechanical strains tending to cause them to shed the active material.

Instead of pure lead an alloy of lead with a few per cent. of antimony is generally used in the construction of accumulator electrodes, which is much stronger.

..COMMUNICATIONS..

Some Reflections on the Show.

SALEM, Mass., February 6.

Editor HORSELESS AGE:

When away from the glitter and glamour of the Automobile Show, and unaffected by the surroundings, the thought presses hard upon me that even though the many makers represented strained their faculties to produce vehicles, they did not even present a carriage that would take the place of horses at all seasons. Therefore we must continue to regard the automobile as a plaything—a costly toy, as it were.

Utility, economy and adaptability to all circumstances are what users naturally ask for in an automobile, but some of the qualities enumerated were overlooked by about all the builders represented in New York. Instead, they strove to show a glitter of paint, brass, and a combination of mechanical devices that might give speed and power. Aside from a few foreign entries, there was hardly a carriage built for anything but pleasant weather. A few small machines did have tops, but they were in the minority and did not attract much attention.

Some of the touring cars, costing from $2,500 to $7,500, were not even provided with rubber boots with which to meet the many showers of the good old summer time. A touring car should be arranged for the comfortable accommodation of passengers in most any sort of weather, and the manufacturers should provide the proper covers.

Maybe I shall still be looked upon as a pessimist if I write that I cannot see any hope of giving up my horses, even if I avail myself of the latest and best thing offered at the New York Show. The equines will continue to munch their hay and oats, and perhaps wink at each other when they see the new touring car roll into the stable. The intelligent animals know that they will have work to do, even though I may have a dozen automobiles under the roof. I'll admit again, as I have often said, that it is possible to push an automobile over any sort of a road, and through piles of snow, but the effort is not worth the cost, because a $150 horse will do such work better.

I am willing to admit that the New York Show was an immense success, for it made the 1901 exhibition resemble something like 18 coppers. There was a tremendous exhibition of carriages of every description, and it was a show that reflected credit upon both the exhibitors and the managers of the affair. Still, I contend that the maker—and possibly the public—has gone clean dafty over vehicles designed just for pleasant days. While the automobile is a popular fad

such carriages will be in demand. A fad, however, cannot survive many seasons, and then the makers must look to the great public for support.

Speaking of practicability, I noticed that on one of the best cars the tonneau step was so arranged that the rear sprocket was inaccessible. I wondered how the man in charge of the machine would manage to get his chain repaired unless the vehicle was stripped. And the same vehicle had valves and levers cunningly hidden where the operator would have to reach down under his legs to get at them. Other carriages had arrangements just as badly designed.

I admit that automobiles now on the market will run long distances without causing trouble, climb all kinds of hills, and have other desirable qualities, yet the man who imagines that a $5,000 tonneau touring car is going to make him happy will be disappointed. And it is the same with the fellow who buys a $500 runabout.

Viewed as a sport or a pastime, automobiling is great fun. Looked at from a business standpoint, the matter assumes a different position. I know—or have read—that some people really use automobiles in place of horses, although a few admit that in bad weather or hard traveling they either hire a horse or go on electric cars. Some who have had good luck figure that they can run a horseless carriage cheaper than they can keep even one horse. Cases of that sort are the exceptions that prove the rule.

In 1900, when I first heard an engine running in a carriage I owned, I often told people that in two or three years horses would be regarded as curiosities—and I think I kind of believed that what I was saying was likely to prove true. I now see that I was just talking hot air. Horses are still seen, and in New York they are used to haul street cars.

I have taken a vehicle known in this section as a coupe-rockaway as a model for what I should call a family carriage. This has a solid wood top, a removable glass partition in front, windows in the doors, sides and back. In cold or stormy weather the windows may be closed, giving protection to passengers. In summer everything can be opened. The windows are always ready to be put up in an instant. An automobile combining the qualities I have mentioned might be built and be serviceable. I know that a few builders have tried to construct such a carriage, but the work was done in a half hearted way, so that no success was achieved.

The foreign builders are trying to make carriages that will assure comfort for the owners in a way, and some have done really well. American makers, however, continue to turn out carriages that are designed for muslin gowns and flannel suits, to be used only when the sky is clear.

I would not attempt to either build a carriage that would suit me, or even try to tell a maker what I wanted in all its details. I can, however, say that my idea is a machine that will supersede the horse for every purpose for which a carriage is used. I will modify my demand by cutting out the use of horses for business purposes. I want an automobile that will be able to do all the driving I or my family may require. In view of the many promises made by enthusiastic manufacturers, the proposition I have set down should not be difficult to accomplish. It is certain that such a vehicle would have a ready sale at a good price, so the prize is worth seeking for. Perhaps when the present craze or fad for purely pleasure vehicles subsides we may get machines that will be useful as well as ornamental.

ROBIN DAMON.

Show Suggestions.

READING, Pa., February 2.

Editor HORSELESS AGE:

Since arrangements have already been made for the use of Madison Square Garden for the next two shows, it is probably useless to advocate a change in the date and place, but a little agitation will do no harm. The motor vehicle is not shown to its best advantage in a building, and on this account motor vehicle exhibitions, like State and county fairs or horse races, should be held out of doors. An enclosed paddock with track, steep hills, rough roads, deep sand and even artificial mud holes should be provided, over which the vehicles should be run, and thus permit the public to see them in action upon such classes of roads as they are interested in. The man living in a locality having nothing but good roads could study their behavior on the track, while a man who never enjoys the pleasure of good roads (and there are many such) could watch the service given on the bad roads provided for this purpose. Such an exhibition would be full of life and be far more enjoyable than a still show in the Garden. It might not attract so many curiosity people, who simply go to pass an evening or see and be seen, but would attract more of the practical people who are looking for an automobile for their service. It would further get rid of the indescribably bad ventilation found at the Garden. Everyone knows that every crevice in the big building is filled with dust and disease germs, and when packed with several thousand people it is certainly far from sanitary and not calculated to inspire an energetic enthusiasm toward motor vehicles or anything else. The enervating influence of a half hour's walk around the show was noticed and remarked by many; and better ventilation would have meant greater enjoyment and more business. Not only was the air vitiated by the large number present, but in spite of the "No smoking" signs quite a number of smokers were in evidence, indulging their appetite, regardless of the rights of others. Not only were they among the vis even attendants were guilty of thi of good conduct. To insinuate was, to say the least, ungent would hurt somebody's feelings, fact remains that the selfishness smokers did unquestionably aggra already bad ventilation. People fr complain about the odor of a vehicle, and so great is the incor of humanity sometimes that co have been made of the amount o left behind when, as a matter of cigar in the mouth of the complair causing two-thirds of the cloud. door exhibition would remove this tion objection, permit visitors to operation of the vehicles and sper examining them without that tirec which follows a little exertion i atmosphere.

CHARLES E. D

The Show as Seen by a S Enthusiast.

Editor HORSELESS AGE:

The showing of steam vehicles a son Square Garden, although nur small, was extremely good. Th was naturally attracted to the la cylinder gasoline road locomotives one in ten of the spectators could cessfully if a machine were pres them. Not two out of ten coul ably afford a capable chauffeur to l for them. Tire expense is enorm the heavy cars. They are very fine at. They are the kind one would friend own and go out with him o ally. The little steam runabout tl quietly, strongly and minds neitl nor sandy roads, with small tire and which is not only horseless bu fearless, is what the average man w should like to see a statement of tl ber of steam and gasoline machin in successful operation by their o this country. The showing of ele probably indicative of the impro ciency of batteries. Even a steam agree that the show was a great o worth a trip to the metropolis to se

HENRY P. B

Amateur Built Gasoline (

TYRONE, Pa., Janu

Editor HORSELESS AGE:

I send you herewith a descriptio automobile which I hope you will space to publish in your very help interesting journal, of which I am stant reader.

The vehicle is designed for speeds and rough roads, being mo engined and substantially built, t weight being about 1,000 pound frame is of wood lined with steel, side of this frame there is a subf three-eighths inch by 3 inch angle which the motor and transmission supported. The wheel base is 9

e tread 62 inches. The front wheels inches in diameter and the rear 40 inches; they are of the Sarven and fitted with sectional rubber The front axle is of 2 inch square and the rear axle is also of 2 inches er and surrounded by a one-half bronze casing, to which the rear are connected. The rear axle is with a Brown & Lipe differential gear ns in plain bronze bearings.

engine is a twin cylinder, vertical, cle one of 5½x5½ inch cylinder. Its can be varied from 150 to 700 revo- per minute, and it is rated at 8 power. The cylinders exhaust each separate muffler, directly, and a cut- fitted on the exhaust pipe which is andy on steep hills. The pump for culating system is geared directly to gine shaft. The water tank and coil ated under the footboard of the car- The coil contains 90 feet of one inch pipe and the water tank has a capa- f 4 gallons, while the gasoline tank y is 10 gallons.

transmission gear is of the chain rocket type, giving two speeds ahead, aximum speed being 20 miles per A Baldwin ⅝x1½ inch pitch chain l. The engine is started by a crank nt. The ignition current is supplied lynamo, no battery being used. The o runs at 4,000 revolutions per min- d gives a good, hot spark. The en- is strong enough to slip the rear on the low gear. I have built the ie in a shop 12x16 feet, making every- except the tires, wheels, dynamo and ntial.

S. S. NEIL.

New Idea for Raising a Good Roads Fund.

PASADENA, Cal., January 30.

Horseless Age:

g to enclose an article which I wrote blication in this morning's *News*. It o doubt, be of interest to your read- The scheme is similar to the trips by the stage coach "Old Times," runs in summer from Chicago to and Park and which is driven by men members of the Saddle and Cycle The owners of touring cars who ke part in the first Pasadena-Pomona are Messrs. Ellicott Evans, Charles ville, B. F. Thurston, Robert H. Gay- Frank Hutchinson, A. Kingsley Ma- r, Joseph T. Pugh, Jr., H. T. Ken- G. Lovell and Tracy C. Drake. Ap- ate names have been given to the such as "The Blue Streak," "Red r," "Road Runner," "Scarlet Ram- "Red Rover," "Blue Dog," "Cardinal " etc. A charge of $5 for the round ill be made, so it is anticipated that the tourist season, the amount of $1,000 will be raised as a nucleus for d roads fund."

lieve that if your valued paper will rate with us in urging similar schemes to be adopted by other clubs, it will help the goods roads movement very much.

TRACY C. DRAKE.

(ENCLOSURE.)

"The members of the recently organized automobile club, carrying out their promise to accomplish something of benefit, have conceived a unique scheme for securing a good roads fund. They will inaugurate next week, and continue for about two months, a series of triweekly tours for the public, from Pasadena to Pomona and return. Two or more large touring cars, according to demand, will leave the Hotel Green at 9:30 o'clock on Mondays, Wednesdays and Fridays, each car carrying three passengers, arriving at Pomona at noon, where luncheon will be served at Hotel Palomares.

The return trip will begin at 2 o'clock p. m. Hotel Green will be reached at 4:30 p. m. The distance to Pomona is 30 miles, making a round trip of 60 miles. The main highway, which is one of the best roads in this vicinity, passes through one of the prettiest sections in Southern California.

"It is anticipated that the demand for seats in the automobiles will tax the capacity of the club members offering their services to this scheme, as an automobile tour under such circumstances cannot fail of being most attractive to many tourists who have never ridden in these large touring cars, and the fact that the owners of the machines will operate them will give confidence to the timid.

"The entire proceeds of the tours will go toward a good roads fund, and the cooperation of the public will indirectly create a sentiment in favor of the improvement of our highways, and eventually lead to legislative appropriations for this most important purpose. It is desired by the promoters that the public should appreciate the fact that this is not a private money making scheme, but a broad, sportsmanlike method of doing something for the establishment of good roads and for the advancement of the sport of automobiling."

Flash Boiler Queries—"Berlin" Iron.

Editor HORSELESS AGE:

Two statements have been contributed to THE HORSELESS AGE, reasons for which are not perfectly clear to me. Will you favor me with an explanation?

It is stated that superheated steam cannot be used to special advantage over saturated steam in case of a compound engine. Does this refer to slightly superheated steam or to steam of, say, 700° superheat, and what property of superheated steam would diminish its advantages when used in a compound engine?

It is also stated that liquid fuel for a flash generator of the upward feed type cannot be regulated by a thermostat depending upon the degree of superheat to the steam. Why could not the Hyler-White generator be efficiently regulated by steam from the top coil being carried downward through a thermostat located in the combustion chamber?

Is Berlin iron known to your readers? It is said to be a very fusible variety of iron. Are temperature of fusion and where it can be purchased known? Also whether it would stand excessive pressures sometimes to be expected in Hyler-White cylinders—supposing an extreme case of 600 pounds in starting suddenly?

STEAM.

[The first statement to which you refer was probably to the effect that the superiority of a compound engine compared to a single engine is less when superheated steam is used than when saturated steam is employed. The advantages of a compound engine are essentially that it will reduce the tendency to cylinder condensation and that a higher degree of expansion may be obtained. Now, if the steam is highly superheated there would be no cylinder condensation even in a simple engine, so this advantage of the compound engine would not apply with superheated steam. Consequently with highly superheated steam the only advantage of the compound engine is that it permits a higher ratio of expansion.

The answer to your second question you will find in former articles on flash boilers by Mr. Bickford, particularly in the article which appeared in the issues of October 30, 1901, and December 17, 1902.

We have never heard of the brand of the iron you mention and beg to submit the question to our readers.—ED.]

Automobile Damage Case Adversely Decided.

PORTLAND, Me., February 3.

Editor HORSELESS AGE:

In a case before the Supreme Court here, brought by a young woman against an automobilist to recover $2,000 damages alleged to have been sustained in a runaway caused by the automobilist's machine, a verdict has just been rendered in favor of the complainant, allowing her $600. Exceptions have been filed in the case and it will go up to the full bench.

The parties concerned in the suit met each other on one of our widest and straightest streets, the automobilist proceeding at a rate of from 4 to 5 miles an hour and the horse driver at 11 miles per hour, according to the testimony offered. The defendant, Mr. Chaplin, when nearly 400 feet away turned to the right into the gutter until his forward wheels struck the curb. The horse passed him safely, but when about 200 feet beyond the automobile, in making a turn, a wheel collapsed, owing to its catching in the street car track, and the carriage overturned. The occupants were thrown out, but no evidence was introduced showing that they had received serious injuries.

The evidence showed that the horse had run away six times on previous occasions, smashing carriages and endangering the

life of the driver, and at one time had dragged a little girl a long distance, owing to her foot having caught. The owner of the horse testified that he had sold it because he did not consider it a safe horse for his wife to drive. Two former owners, both well known and influential citizens of this place, told of their troubles with it, and both sold the animal with the distinct understanding that it was fit only for a saddle horse.

Mr. Chaplin is a much respected citizen, an automobilist of about three years' experience and a most careful and considerate driver. On this occasion he acted according to his best judgment and did exactly as every other experienced automobilist would have done and what every competent horseman would have wanted him to do—i. e., steered toward the side of the street and gave the horse the whole road. Automobiles have been used on our streets for the past four years, and at present about seventy are owned here. This is the first case of the kind, and if this verdict stands on appeal it will practically mean that the owner of an automobile has no rights on our streets.

HENRY R. STICKNEY.

Spring Queries.

Editor HORSELESS AGE:

Will you please inform me in your next issue at what temperature coiled steel springs cease to be useful as springs? Also at what temperature brass coil springs become useless? What is the temperature in the explosion chamber, after being thoroughly warmed up, of a gasoline engine that has a water jacket?

C. R. PONTIUS.

[Steel springs are tempered to about 550° Fahr., so that if they are heated above this temperature in use they will lose some of their flexibility or spring power. If the spring is raised to a bright red heat it of course loses all spring power immediately, although the loss of spring power takes place gradually with the increase in temperature; where it ceases to be useful as a spring is, we believe, a question that cannot be answered definitely. Brass springs lose their spring power completely when heated in an ordniary gas flame.

The temperature in the engine cylinder varies greatly at different parts of the cycle. The explosion temperature is approximately 1,600° Fahr.—ED.]

Objectionable Clause in Good Roads Bill.

Editor HORSELESS AGE:

Permit us to call attention through your columns to a "Good Roads" bill that has been or is about to be introduced at this session of the Legislature of the State of Pennsylvania, having been prepared by Arthur Kirk, of Sharpsburg, Pa. This bill was before the House of Representatives in 1901, but was not passed for some reason. Whether the next attempt will be more successful is, of course, not known. While the bill as a whole is probably a good one so far as it applies to good roads, it contains a slap at automobile users that is unquestionably unfair and uncalled for, and this section should be stricken out or amended before the bill is passed. It is Section 38, and provides that "Every owner or user of an inanimate motive power propelled road traveling vehicle shall annually pay to his or her county treasurer (except makers) $20 on or before the first day of April of each year, or $3 per month for any fraction of a year. For which he or she shall be given a licensed figured plate by the county engineer, which must be conspicuously attached on the left side of the vehicle, so that its number can be easily read while the vehicle is in motion, and if the above license fee is not paid before the tenth day of each year, 50 cents for each month or fraction of a month. The above license fee, with the cost of collection and all penalty for non-payment of license, shall be paid to the informer who made information that license for that year has not been paid."

CHARLES E. DURYEA,
First V. P. American Motor League.

An Early Gasoline Automobile.

WINTON PLACE, Ohio, January 30.

Editor HORSELESS AGE:

I think it was about 1885 that I built my first vehicle operated by an engine which used gas derived from vaporizing coal oil of 150° test. This machine at the time created quite a sensation among my neighbors and I think it would put to shame some of the present automobiles.

The vehicle was of the three wheel type —that is, it had two wheels which tracked and a third one which stood to the left, forming the outer wheel. The main drivers were about 36 inches high and had a face of about 4½ inches. The entire frame of the machine was a hollow casting, and in this casting was located the compound gearing, somewhat to the rear of the seat. The engine, which was of the vertical type, was arranged in front of the driver. The tank carrying the oil was suspended between the pilot or steering wheel and communicated with a small retort chamber, the vapors from this retort chamber being conducted to the engine cylinder through an inlet pipe, in which the mixing with air took place. The whole apparatus was convenient for handling, as all levers were directly in front of the driver, and the various devices could be operated without intermediate rods or chains for transmission.

The gearing between the engine and the drivers was composed of a set of bevel gears and a set of spur gears, the main gears having a face of about 3 inches width. The machine was very powerful for its weight, which was between 1,500 and 1,800 pounds. There were no springs between the gearing and the main driving axle. Springs were only used to support the seat for the operator, and these were of the full elliptic form and located above the floor of the vehicle.

Of course, in those days we had no pneumatic tires, and riding over ordinary roads was a very rough sort of sport. For this reason I abandoned my machine after the novelty had worn off and I had made several runs which were then considered long, the longest one being about thirty miles. I took a party of excursionists who occupied old style coaches with the tongue sawed off close and attached to the automobile in tandem fashion.

On one of my last runs we passed through a deep cut in the road in which a farmer had dumped a lot of dead grass raked from his field. In passing through this the exhaust from the engine set the grass on fire, and it was with difficulty that we saved our train. So far as I know, my machine was the first one in this country operated with an explosive engine, or of what is now known as the hydro-carbon type. After I had abandoned the machine for road use I put the frame with machinery in the top of one of my barns and attached wire ropes to the rear axle, and used it for some years as an elevator to lift grain by. I think it still remains in that position.

V. L. EMERSON.

Two Cycle Engines.

Editor HORSELESS AGE:

I am a constant reader of your valuable paper and have been interested in the articles on two cycle engines. I have used both two and four cycle, and am thoroughly familiar with each of them.

I have run a two cycle engine a whole season without adjusting a single bearing, when with my four cycle engine every little while the connecting rod would have to be taken up, for the reason that with every other stroke there are two heavy jerks on the connecting rod, as the charge is sucked in and compressed, when with a two cycle engine the pressure is always one way. Then, with my two cycle engine there is no valve to leak or get out of order, while with the four cycle there are the inlet and exhaust valves to leak, springs to break, and cams and gears to wear and get out of order.

My two cycle engine has two cylinders. It is controlled by the air and spark. I can throw out all the machinery, leaving the engine to run without any load. It will run slowly and at a constant speed, and when you wish to go ahead it will run up to full power and speed as quickly as any steam engine. In other words, the controlling lever acts the same as a throttle lever on a steam engine—by moving the one lever the engine speed can be varied from 200 to 1,500 revolutions per minute.

My muffler is so constructed that the exhaust is very soft and only shows one-

quarter pound back pressure. Many mufflers will give 2 to 3 pounds back pressure. We all know that the sparking apparatus gives nine-tenths of all the trouble, and that nearly all of them are inside the heads or cylinders, so that it is impossible to see the spark. By taking a 1 inch plug out of my engine you can see the spark at once, and by loosening one screw the points can be taken out in an instant, cleaned and replaced.

The points are so arranged and constructed that oil will not affect the spark, when with the ordinary sparking apparatus a little too much oil will coat them over and they will refuse to spark.

Quite a little is said about the two cycle engine not filling the cylinder full of fresh gases. I claim that it fills it more completely than any four cycle ever made.

The four cycle people also make the claim that they do not waste any gas. Perhaps not, but I have seen many mufflers burst on four cycle engines, but never saw one burst on a two cycle.

BANKS.

Editor HORSELESS AGE:

The writer notes that quite a spirited discussion has arisen on the merits of the two cycle engine, which has evidently been started by some of my former questions.

In Mr. Roberts' article in the issue of January 14 the statement implying that ignorance causes some people to think the two cycle motor is not as well adapted for launches or automobiles as the four cycle might be taken as true in a way, but does not appear to be helpful to get at the facts of the case. It may be true in the same way that through ignorance the people of the world today do not use flying machines in place of automobiles, which would be a great deal more satisfactory and economical, as the enormous expense of good roads would be avoided.

The writer has had some experience with both two and four cycle motors; in fact has sat up nights with them, and has studied the problem carefully, with a view of adapting them to automobile use. He believes the most simple construction of the two cycle, air cooled motor would be the best for automobile use. One reason the two cycle motor appears to "choke itself" is without doubt that the time of admitting the fresh charge is so much less than it is in a four cycle motor; the intake port should be several times greater than in the four cycle to get the same volume of air and gas into the cylinder. This is not a difficult problem, and is evidently provided for in several two cycle motors, and I see no reason why the two cycle motor cannot be made to develop over 100 per cent. more power per cylinder than a four cycle motor of the same bore and stroke.

The loss of power from friction of moving parts should not be as much as in the four cycle, which gets an impulse only once in two revolutions or four strokes of the piston, as the two cycle would save the power lost by the friction of the piston during the exhaust and intake stroke.

My experience with both makes me think the two cycle is the more flexible of the two, and it certainly is an advantage to have more power at slow speed, and be able to increase or diminish the power quickly, which the two cycle is capable of doing. Two reasons for this are that the impulses of power come twice as fast, and the weight of balance wheel can be reduced about one-half, which results in quicker acceleration. H. J. WILLARD.

[The discussion on two cycle engines is herewith closed.—ED.]

Who Manufactures Crucible Angle Steel?

Editor HORSELESS AGE:

Can you give us any information as to where we can obtain nickel steel tubing, also crucible angle steel? We would very much appreciate any help you could be to us in this line. MFG. Co.

[We shall be glad to forward any replies.—ED.]

The Soller Carriage.

BOSTON, Mass., February 7.

Editor HORSELESS AGE:

Referring to the description of the Soller gasoline carriage in your issue of February 4, Mr. Soller informs me that the motor is a single cylinder, two piston construction, of 12 horse power, and is quite free from vibration. The transmission gear has been replaced by one of American make. A. B. FOWLER.

Explosive Engine Queries.

Editor HORSELESS AGE:

In referring to your issue of October 1, 1902, I notice an answer to an inquiry on compression by Gelles Heller. Will you kindly state whether your answer is absolutely correct? Also whether you use Boyle's or Marriotte's law? What is the compression above atmosphere in French engines using either alcohol or gasoline?

JOHN GRAHAM.

[The compression is calculated on the assumption that it is adiabatic—i. e., that the heat generated by the compression remains in the gas. Boyle's or Marriotte's law would not take into account the effect of the heat produced in compression upon the compression itself, as it assumes constant temperature. The answer is correct upon this theoretical basis, but of course in practice there is always some leakage and also more or less exchange of heat between the gases under compression and the cylinder walls, which factors must be neglected in the calculation.

We do not know of any standard compression being employed by French manufacturers of motors using both gasoline and alcohol. It has repeatedly been stated that the compression should be slightly less with alcohol motors than with gasoline motors, but we doubt whether any manufacturer has really changed the compression of his motors for this reason, as alcohol is only rarely used as yet.—ED.]

Depreciation Owing to Advances in the Art and to Fashion.

SALEM, Mass., February 8.

Editor HORSELESS AGE:

The machine work on many automobiles now seems well nigh perfect—and that's a great gain over the earlier attempts. Carriages can be made to run a mile a minute or less, and they have been pushed 100 miles without stopping. Such things are very well for people who want to perform stunts, but somehow it does not strike me that the ability to travel faster than the wind is a strong recommendation, for few care to cover the ground at such a pace. It is not often, either, that pleasure or business demands a continuous journey of 100 miles without a stop.

It is perhaps a good recommendation for a machine to say that it can beat anything on four wheels, yet the ordinary man does not hanker after the kind of excitement caused by fairly flying through space. I therefore conclude that the useful automobile—and the style that will eventually become popular—will be one designed to be employed any time, exactly as horses are.

While on the subject of styles I want to say a few things about the changes made by even the leading makers. It has got so that a carriage a year old is regarded as mere junk in the sporty circles of high toned automobilism. I remember that last summer I drove a 1901 machine into New York city, and some of the helpers at the stable pleasantly inquired where I had dug up that Noah's ark—and the machine had only been out of the factory six months.

When at the New York Show I talked considerably with the representative of one concern that has sold a lot of carriages at good prices. He blandly told me that the 1902 model was fairly decent, but advised me not to buy one at any price, at the same time pointing out its weaknesses, saying everything had been remedied in the new machine. One pleasant feature he mentioned regarding the 1902 style was the steering post might snap off at any minute.

A few men can and will have a new automobile every year, but the majority either do not want to bother with a change or cannot afford to make one each spring. Yet to keep in the swim one must not be seen with a last season's carriage any more than a lady wants to wear her 1902 summer hat in 1903. An aristocracy in automobilism is being plainly established. Not more than three years ago any old thing on wheels was good enough, but in a short time things have changed remarkably. ROBIN DAMON.

NEW VEHICLES AND PARTS.

The Moyea Gasoline Touring Car.

The Moyea Automobile Company, with offices at 3 West Twenty-ninth street, New York city, are at present equipping their factory at Rye, N. Y., for the manufacture

FIG. 1.—MOYEA TOURING CAR.

of a gasoline touring car, the model of which was shown at the recent Madison Square Garden Exhibition. The Moyea car is designed entirely on French lines.

The chassis is constructed of armored wood, the steel reinforcement of the wood beams varying in height from the middle of the frame toward both ends. The spring hangers and shackles are of steel. The body frame is supported on the axles by means of four semi-elliptic springs, the front springs being 32 inches long and consisting of five leaves, and the rear springs being 36 inches long and having six leaves. Both front and rear axles are solid forgings and are equipped with ball bearings. The wheels are of the wood artillery pattern, 32 inches in diameter and fitted with 4 inch Goodrich clincher tires. The front wheels have ten hickory spokes and the rear wheels twelve. The driving sprockets combined with brake drums are fastened to the spokes of the rear wheels by means of bolts, in accordance with the usual French practice. The wheel base of the car is 88 inches and the tread 52 inches.

The engine and transmission gear are supported on a false angle iron frame which is located considerably below the level of the main frame and is supported from the latter by means of arched steel hangers.

THE MOTOR.

The motor is a four cylinder vertical one of 4 inches bore and 5½ inches stroke, and is rated at 16 horse power. It runs at speeds from 200 to 1,200 revolutions per minute. The crank casing is of aluminum and is divided on a horizontal plane through the bearing centre. The four throw crank shaft has three bearings, a comparatively long bearing at each end and a shorter one in the centre. The cylinders are cast in pairs and integral with the cylinder heads and valve chamber. The water jackets extend down the cylinder only about one-half the length of the piston head travel, but completely surround the cylinder heads and valve chambers. The intake and exhaust valves are arranged in line with each other to one side of the cylinder, the intake valves being operated by suction. The cam shaft is driven from the crank shaft by means of spur gears located outside the crank case, but the cams themselves are enclosed in the crank case. The exhaust openings have a downward inclination of about 45 degrees. The exhaust from all four cylinders is led to the muffler by a single exhaust pipe, which branches out into four separate pipes near the valve chamber, which are connected to the respective exhaust openings by means of bolted flange joints.

The intake valves are constructed on the cage principle, and the valve stem heads and springs are completely enclosed in a cap over the cages, as plainly seen in Fig. 3 herewith. The cages are provided with openings in their walls, by which their interior communicates with an annular space surrounding them, and the annular spaces for the two cylinders of each pair are in communication with each other, so that only one intake connection need be made to each pair of cylinders. The intake valves, it will be noticed, have a flat seat.

The upper half of the crank casing is cast with supporting brackets, as shown in Fig. 3, the ends of which rest upon the angle steel false frame.

IGNITION.

Jump spark ignition is employed, the current being supplied by a storage battery of two cells. The battery is located in the rear part of the body and space is provided for an extra one. A multiple coil is employed, which is arranged in a box fastened to the dashboard on the rear side of the latter. The coil comprises in reality four separate coils, one for each cylinder, each provided with a magnetic buzzer. The circuit breaker is also located on the rear side of the dashboard, directly below the coil, its shaft extending through the board and being driven from the end of the cam shaft by means of a bicycle chain. The circuit breaker is protected with a glass cover and its operation can be observed by the driver from his seat. A small hand switch for the ignition circuit is attached to the dashboard right alongside of the circuit breaker, and it is stated that under ordinary conditions the motor can nearly always be started by throwing on this switch.

COOLING SYSTEM.

For cooling the cylinders 5 gallons of water are carried in a cellular radiator in front of the engine. This radiator somewhat resembles the Mercedes construc-

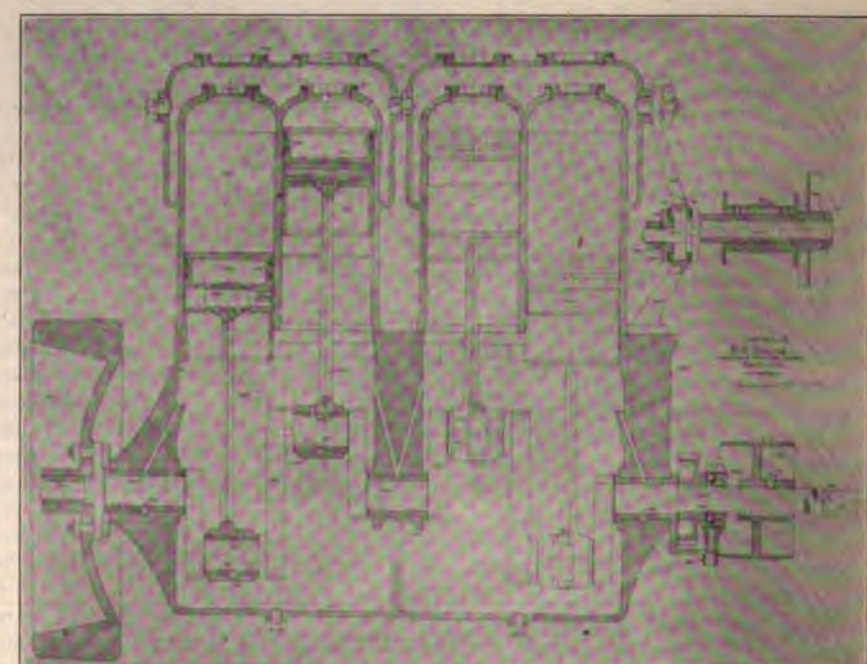


FIG. 2.—SECTION THROUGH CYLINDERS OF MOTOR.

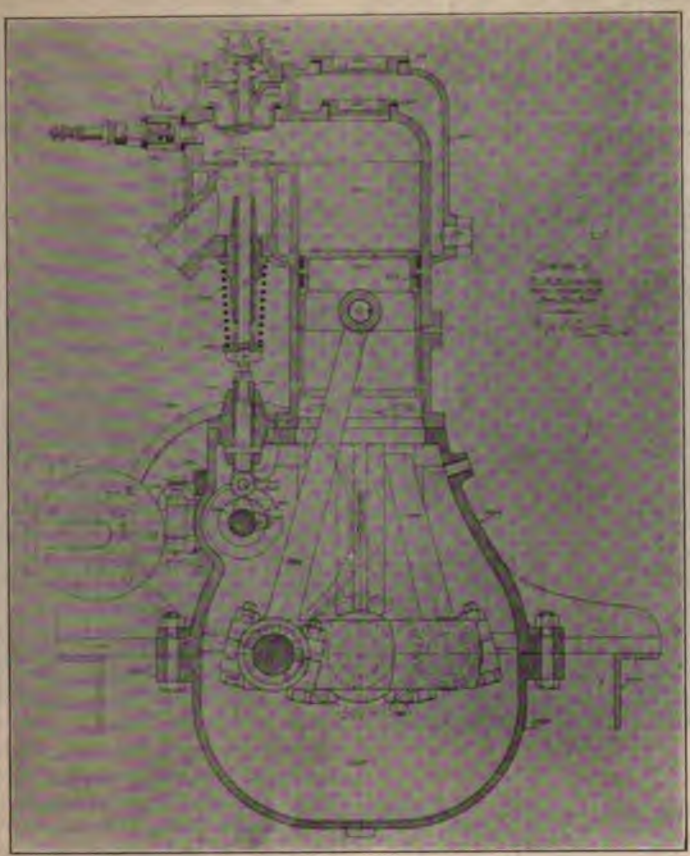


FIG. 3.—SECTION THROUGH CYLINDER AND VALVE CHAMBER OF MOTOR.

, but its side walls slant inwardly. It ierced by 1,900 and some odd three-ith inch tubes, and the air is drawn ugh these tubes by an 18 inch four le fan located directly in the rear of radiator, which is driven from the ine crank shaft by means of a belt, g geared up in the ratio of 3 : 1. The pulleys by which the fan is driven and brackets supporting the stud upon h the fan rotates are shown in Fig. 2. water is circulated by means of a cen-igal pump driven by spur gears from crank shaft at about two and one-half s the angular speed of the crank. The p is seen in Fig. 3, on the left.

single float feed carburetor is used, ch is located at the side of the cylin-opposite the valve chambers. The intake of the carburetor extends up-d for a distance of several inches and ts upper end is provided with a regis-valve. The intake pipe passes between two pairs of cylinders to the opposite of the engine, then upward, and then ns two branches, each connecting to pair of cylinders. The intake pipe is rass tube. The gasoline tank holds 15 ons, which is claimed to be sufficient a run of 125 miles on good roads.

ENGINE CONTROL.

he engine is provided with a centrifu-governor which acts upon two throttle es in the two branches of the intake e respectively. The throttle valves are he type known as butterfly valves and are connected to a single rod passing through the walls of both branches of the pipe. This rod at one end carries a short lever arm which is connected to the governor mechanism arranged on the cam shaft. The action of the governor can be counteracted by means of an accelerator lever rising along the side of the steering column. In one position of this lever the governor controls the engine speed, while when the lever is in the opposite position the governor is entirely cut out.

TRANSMISSION GEAR.

A leather faced conical flywheel clutch is employed to disconnect the change gear mechanism from the engine. The clutch is normally held in engagement by the usual coiled spring, which in this vehicle is located on the gear shaft back of the change gear box. The disengagement of the clutch is effected by means of a pedal.

The change gear is of the shifting gear variety and gives four speeds ahead and one reverse. The gears are cut of steel and hardened. The first and second forward speeds and reverse are 6 pitch and the third and fourth speed gears 8 pitch. All of the speeds are engaged by means of a single lever, which works on a gridiron sector projecting laterally from the footboard of the carriage. This gridiron sector is provided with two longitudinal slots and one central transverse slot through which the lever can be moved from one of the longitudinal slots to the other. When the lever is in the extreme forward position in the slot next to the body the first forward speed is engaged, and when it is in the extreme rear position in this slot the reversing gears are in mesh. The second, third and fourth forward speeds are successively obtained by moving the lever from the extreme rearward to the extreme forward position in the outer slot.

The change gear is enclosed in an aluminum casing and runs in an oil bath. The change gear bearings are plain, but the differential gear shaft runs on ball bearings. The two halves of the differential shaft are provided with square section ends which are slipped into the differential gear, and by simply loosening a couple of nuts which hold in place the ball bearings ot the outer end of this shaft the two sections of the shaft can be withdrawn. The power is transmitted to the rear wheels by means of separate 1½ inch pitch Whitney roller chains. The sprocket pinions have ten teeth and the sprocket wheels thirty, giving a speed reduction from the countershaft to the road wheels of 3 : 1.

LUBRICATION.

The four cylinders of the engine are lubricated from a single Lunkenheimer hand force pump with glass chamber, located on the dashboard directly in front of the operator. A multiple feed oiler attached to the dashboard alongside of the cylinder oil pump supplies lubricant to the bearings of the change gear box through five separately adjustable feeds.

The stopping devices of the car include a double acting band brake on the differential, operated by a pedal; double acting band brakes applied by means of a hand lever, and a sprag attached to the frame of the car at the forward end. The operating mechanisms for both systems of brakes are interconnected with the clutch mechanism in such a manner that the clutch is always released before a brake is applied.

The weight of the car complete is approximately 1,900 pounds. The body is of the tonneau type, with high backs, separate front seats and luxurious upholstering. A maximum speed of 45 miles per hour is claimed. The car is provided with large wood fenders and with a set of acetylene headlights, the generator for which is located on the left hand step.

The German Automobile Union is appealing to the Government to make a monetary grant for the establishing of an automobile museum to show the development of the industry, and in all probability the request will be granted in view of the large amount of German capital embarked in manufacturing automobiles.

The motor launch race which is to be held at Queenstown in connection with the international motor car race in Ireland, for which the sanction of Parliament is to be sought, is awakening considerable interest.

The Wick Touring Car.

The car built by Hugh B. Wick & Co., of Youngstown, Ohio, which was exhibited at the Madison Square Garden and Cleveland shows, is a high powered touring car, built for American roads. It has a four cylinder vertical gasoline motor, placed in front under a bonnet. The bore of the cylinders is 4¼ inches and the piston stroke 6 inches, and at 900 revolutions per minute the engine is claimed to develop 28 brake horse power, and to run quietly and without vibration. The ignition is by make and break spark. Exhaust and inlet valves are located on opposite sides of the cylinders. The crank shaft is made from a solid block and is supported by five bronze bearings.

H. B. Wick & Co. Touring Car.

Forged connecting rods are used, having solid bronze bearings.

The change gear or transmission is of the shifting gear type and gives three forward speeds and reverse, being entirely controlled by one lever. The operating lever of the change gear works on a gridiron quadrant having two longitudinal slots and one transverse slot uniting the two longitudinal ones. The gear shifting lever can be moved laterally from one longitudinal slot into the other and thereby be made to engage one or the other of two short levers, each of which operates one pair of the sliding gears. All parts of the transmission are made of steel, hardened and ground, with a view to reducing wear to a minimum.

The frame is made of commercial rolled I beams and the cross girths are of standard channel section. The body is supported on four semi-elliptic springs, which are said to be extra long and to ensure easy riding. Wood wheels with artillery hubs are used, the wheels being 34 inches in diameter and provided with 4½ inch clincher tires; they run on plain hardened and ground bearings.

Each wheel is driven separately by a chain from the differential and cross shaft, which in turn is driven from the speed change gear by bevel gearing. The transmission, bevel and compensating gears are all enclosed in an oil tight case. Each rear wheel is fitted with an expanding ring brake for use only in emergencies. The regular band brake is fitted to the cross shaft and is operated by a pedal. An interlocking mechanism prevents the gear change lever being operated before the brake pedal has been depressed, which operation releases the clutch.

The car is equipped with a Quinby aluminum body and mud guards. It is upholstered in best hand buffed green leather, either tufted or plain. The equipment includes all necessary tools, baskets, lamps, batteries, magneto sparker and electric lamps operated from a storage battery.

List of Exhibitors at the Chicago Show.

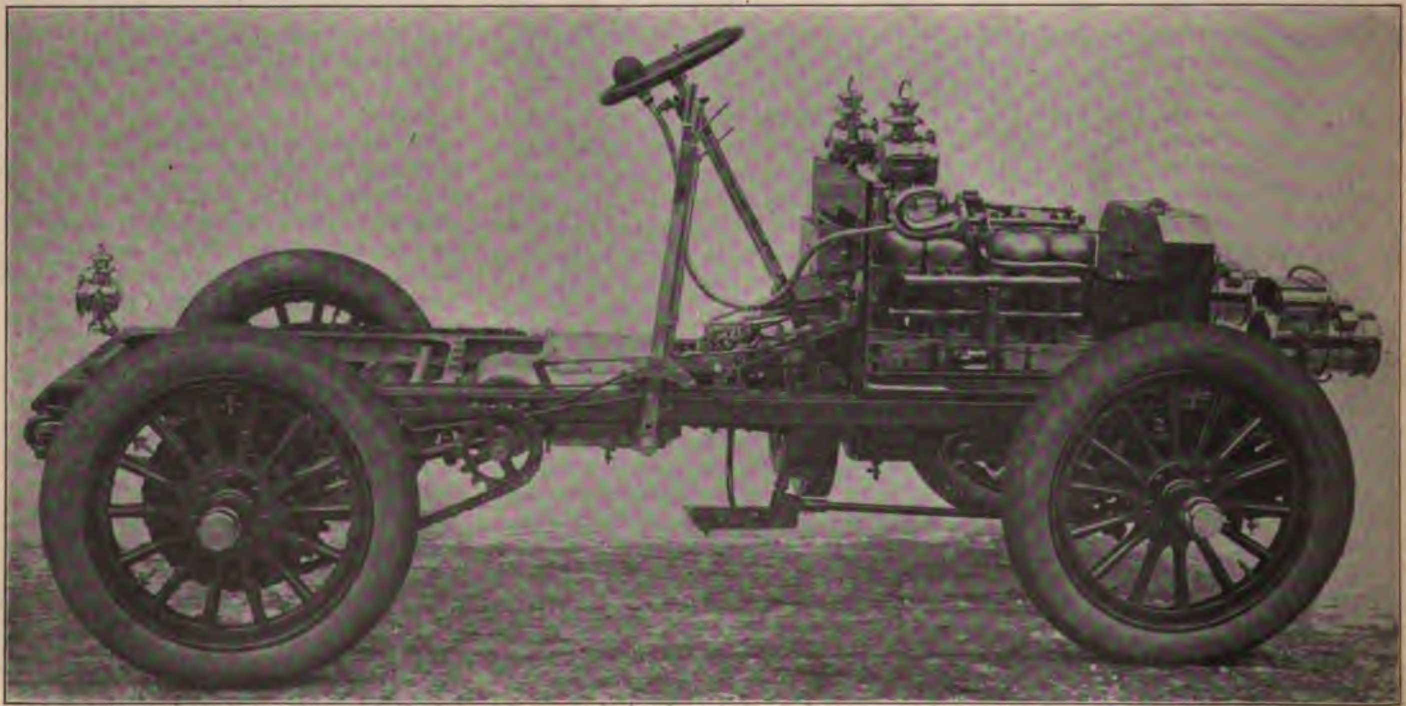
Winton Motor Carriage Co., Cleveland, Ohio.

Pardee & Co., Chicago—

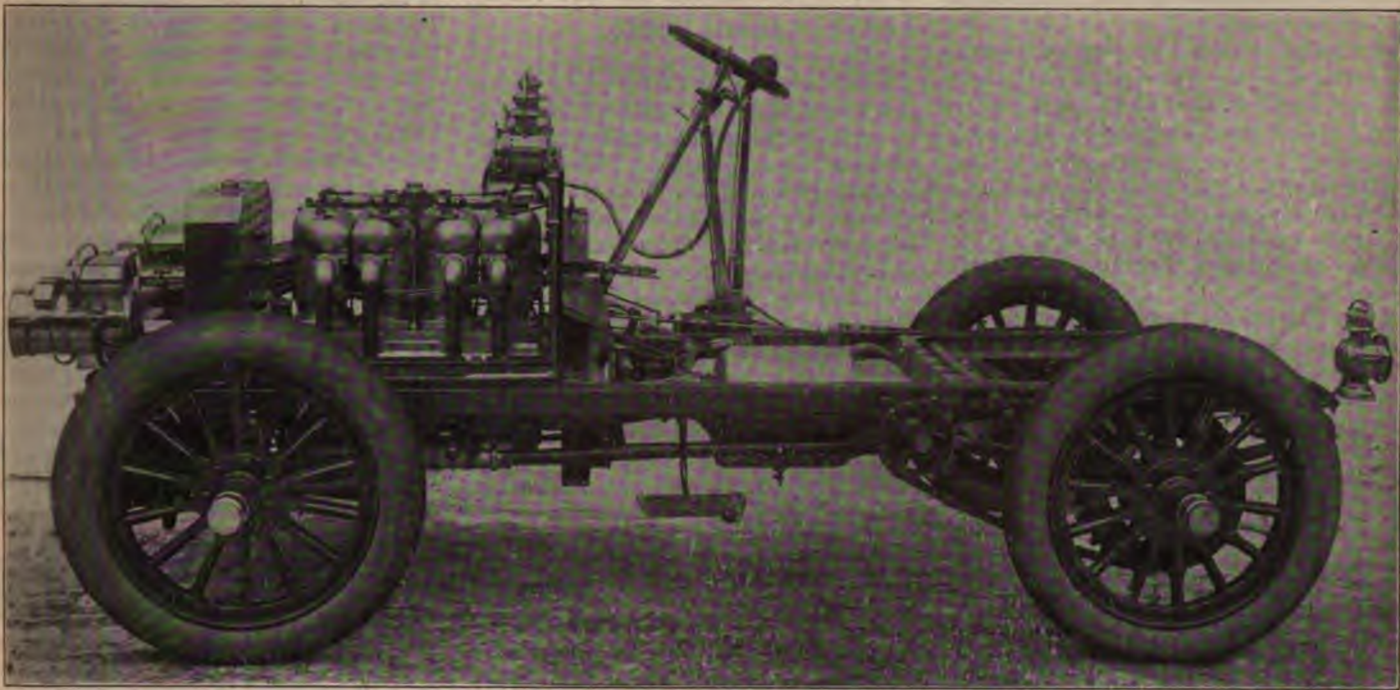
Packard Motor Car Co., Warren, Ohio.

American Motor Carriage Co., Cleveland, Ohio.

Centaur Motor Vehicle Co., Buffalo, N. Y.



Right Hand View of Wick Touring Car Chassis.



LEFT HAND VIEW OF WICK TOURING CAR CHASSIS.

Stearns, B. F., Co., Cleveland, Ohio.
Pierce, Geo. N., Co., Buffalo, N. Y.
Studebaker Brothers Manufacturing Co., South Bend, Ind.
Peerless Motor Car Co., Cleveland, Ohio.
General Automobile & Mfg. Co., Cleveland, Ohio.
Thomas, E. R., Motor Co., Buffalo, N. Y.
Electric Vehicle Co., Hartford, Conn.
Locomobile Co. of America, New York.
Berg Automobile Co., New York.
Apperson Brothers Automobile Co., Kokomo, Ind.
Lindsay Automobile Parts Co., Indianapolis, Ind.
Knox Automobile Co., Springfield, Mass.
Elmore Manufacturing Co., Clyde, Ohio.
Ralph Temple & Austrian Co., Chicago—
Smith & Mabley, New York.
U. S. Long Distance Auto Co.
Franklin, H. H., Manufacturing Co., Syracuse, N. Y.
Standard Motor Vehicle Co., Chicago.
International Motor Car Co., Toledo, Ohio.
Olds Motor Works, Detroit, Mich.
Haynes-Apperson Co., Kokomo, Ind.
Cleveland Automobile Co., Cleveland, Ohio.
Cryder, Henry C., Marion, N. J.
Friedman Automobile Co., Chicago.
Prescott Automobile Manufacturing Co., Passaic, N. J.
Mobile Co. of America, Tarrytown, N. Y.
Shelby Motor Car Co., Shelby, Ohio.
Stevens, J., Arms and Tool Co., Chicopee Falls, Mass.
Jeffery, Thomas B., & Co., Kenosha, Wis.
National Motor Vehicle Co., Indianapolis, Ind.
Cadillac Automobile Co., Detroit, Mich.
Brandenburg Bros. & Alliger, Chicago—
National Automobile and Motor Co., Oshkosh, Wis.
Moore, C. J., Manufacturing Co., Westfield, Mass.
Matheson Motor Car Co., Grand Rapids, Mich.
Illsley, Frank P., Chicago—
Northern Manufacturing Co., Detroit, Mich.
Autocar Co., Ardmore, Pa.
Marble-Swift Auto Co., Chicago.
Kirk Manufacturing Co., Toledo, Ohio.
Wisconsin Wheel Works, Racine Junction, Wis.
Hartford Rubber Works Co., Hartford, Conn.
Jackson Automobile Co., Jackson, Mich.
Crest Manufacturing Co., Cambridge, Mass.
Chelsea Manufacturing Co., Chelsea, Mich.
Conrad Motor Carriage Co., Buffalo, N. Y.
Grant, Louis N., Chicago.
Graham Automobile and Launch Co., Chicago.
Electric Contract Co., New York.
Hyatt Roller Bearing Co., Harrison, N. J.
Elkhart Carriage Co., Auburn, Ind.
Electric Storage Battery Co., Philadelphia, Pa.
Veeder Manufacturing Co., Hartford, Conn.
Shelby Steel Tube Co., Pittsburg, Pa.
Firestone Tire and Rubber Co., Chicago.
Whitney Manufacturing Co., Hartford, Conn.
Standard Welding Co., Cleveland, Ohio.
Goodyear Rubber Tire Co., Akron, Ohio.
Gray & Davis, Amesbury, Mass.
Dixon, Jos., Crucible Co., Jersey City, N. J.
Rose Manufacturing Co., Philadelphia, Pa.
Timken Roller Bearing Co., Canton, Ohio.
Twentieth Century Manufacturing Co., New York.
Fisk Rubber Co., Chicopee Falls, Mass.
Brennan Manufacturing Co., Syracuse, N. Y.
Dietz, R. E., Co., New York.
Hoffman Automobile and Manufacturing Co., Cleveland, Ohio.
Goodrich, B. F., Co., Akron, Ohio.
Badger Brass Manufacturing Co., Kenosha, Wis.
Fisher, Carl, Indianapolis, Ind.
G & J Tire Co., Indianapolis, Ind.
Peterson, K. Franklin, Chicago—
American Roller Bearing Co., Boston, Mass.
Baldwin Chain Manufacturing Co., Worcester, Mass.
Brown-Lipe Gear Co., Syracuse, N. Y.
Cleveland-Canton Spring Co., Canton, Ohio.
Konigslow, Otto, Cleveland, Ohio.
Midgley Manufacturing Co., Columbus, Ohio.
Dasey, P. J., Co., Chicago—
Champion Manufacturing Co., Brooklyn, N. Y.
Dow Portable Electrical Co., Boston, Mass.
Dayton Electrical Manufacturing Co., Dayton, Ohio.
Salamandrine Boiler Co., New York.
Western Motor Co.
Brecht Automobile Co., St. Louis, Mo.
Diamond Rubber Co., Akron, Ohio.
National Carbon Co., Cleveland, Ohio.

Merkel Manufacturing Co., Milwaukee, Wis.
Westinghouse Co.'s Pub. Dept., Pittsburg, Pa.
Motor Development Co., Chicago.
St. Louis Motor Carriage Co., St. Louis, Mo.
Bartholomew Co., Peoria, Ill.
Chicago Motor Cycle Co., Chicago.
Wagner Cycle Co., St. Paul, Wis.
Waterloo Gasoline Engine Co., Waterloo, Ia.
Porter Storage Battery Co., Chicago.
Kammann Manufacturing Co., Chicago.
Speedwell Automobile Co., Milwaukee, Wis.
Pope-Robinson Co., Hyde Park, Mass.
Crompton Motor Works, Worcester, Mass.
McCanna, John F., Co., Chicago.
Motsinger Device Manufacturing Co., Pendleton, Ind.
Mead Cycle Co., Chicago.
Searchmont Auto Co., Philadelphia.
Russell, G. W., Springfield, Ohio.
Tennant, Irwin, Springfield, Ohio.
Flint Automobile Co., Flint, Mich.
Imperial Wheel Works, Flint, Mich.
Premier Motor Manufacturing Co., Indianapolis, Ind.
Wick & Co., H. B., Youngstown, Ohio.
Willis, E. J., New York.
Chicago Storage Battery Co., Chicago.
American Darracq Automobile Co., New York.
Sandusky Automobile Co., Sandusky, Ohio.
Westerfield Motor Co., Anderson, Ind.
Lozier Motor Works, Plattsburg, N. Y.
Buffalo Electric Vehicle Co., Buffalo, N. Y.
Racine Boat Manufacturing Co., Racine, Wis.
A. H. Funke, New York.
Standard Anti-Friction Equipment Co., New York.
Johns-Manville Co., New York.
Standard Carriage Lamp Co., Chicago.
Western Storage Battery Co., Indianapolis, Ind.
American Gasoline Motor Co., Chicago.
Tincher, T. L., Chicago.
Hoffman Motor Co., Cleveland, Ohio.
Pittsburg Reduction Co., Niagara Falls.
Brandes, J. C., New York.
Fanning Manufacturing Co., Chicago.
Fredonia Manufacturing Co., Youngstown, Ohio.
Columbus Motor Vehicle Co., Columbus, Ohio.
Briscoe Manufacturing Co., Detroit, Mich.
Union Automobile Co., Union City, Ind.
Muncie Wheel and Jobbing Co., Muncie, Ind.
Bowman, Sidney B., New York city.
Jones, Corbin Co., Philadelphia.
Warner Differential Gear Co., Muncie, Ind.
Barton Boiler Co., Chicago.
St. Louis Motor Carriage Co., St. Louis.
Duryea Power Co., Waterloo, Ia.
Libal, Joseph, Chicago.

A. C. A. Discussion on the Automobile Show.

On the evening of February 3 a discussion was held at the clubrooms of the A. C. A. on the lessons of the recent Show at Madison Square Garden. Winthrop E. Scarritt presided and opened the discussion. He said that among the things he observed at the Show was, first, the good fellowship that prevailed among the manufacturers; they could be seen hobnobbing together, and giving each other points on construction, etc. Another thing observed was that rapid and substantial progress had been made during the year all along the line, and finally it was noticed that manufacturers are beginning to standardize their product and turning out machines which may be classified somewhat as follows: The light runabout, seating two people, for general use on city streets and on good roads in the vicinity of towns; the medium weight car, which is of somewhat higher price, and has a greater range of usefulness than the light runabout, and finally the large heavy touring car. The speaker said that although he was a manufacturer himself, he admitted that the French were at present slightly ahead of us. They had, of course, had longer experience than we, and it was a promising sign that all French visitors who had recently come here had expressed themselves to the effect that we were progressing more rapidly than they, and he thought there was no reason why within a period of five years we should not overtake them. It was a fact that the cars built in Paris and Cannstadt were built with American machinery, and we had every reason to expect that if the American inventor and mechanic were given a little more time to develop a standard design of automobile they would soon lead the world in the manufacture of automobiles as well as in the manufacture of machine tools. It had been particularly gratifying to note what fine bodies American manufacturers could turn out, which were better in workmanship than anything that could be obtained in France.

Mr. Adams, of Adams & McMurtry, was the next speaker. He thought that what the American public wanted most in an automobile was simplicity, and that in this respect American manufacturers were certainly ahead of the foreigners. He was glad to see that a standard in design was being approached, and thought that the sooner we arrived at a standard the better it would be.

Another speaker was Mr. McMurtry, who recently attended the French exhibition, and who was therefore able to make some comparisons. He thought that the American manufacturers were handicapped in a number of ways. In the first place they did not have the good roads of France to test their machines out on; then they found the parts manufacturers less accommodating, and he thought that particularly in the line of ignition apparatus were the Prench in advance of us. Very few dry batteries had been shown at the Paris exhibition, the most frequent source of current for ignition on the French machines being small storage batteries. The number of exhibitors of various kinds of ignition apparatus in the gallery of the Grand Palais had been almost endless, and it had been interesting to note how eager they were to satisfy every want of customers. For every one of the makes that had been sold in considerable number, such as the De Dion, Darracq and Clement, special batteries were put up in cases fitting exactly into the spaces provided for batteries on these vehicles. Firms making a specialty of ignition apparatus supplied to the manufacturers cables for ignition connections of stranded wire, heavily rubber insulated, cut to the right length, and provided with connectors at both ends. He had observed that a considerable number of machines at Madison Square Garden were wired with bell wire. Ninety per cent. of all machines at the 1901 Show and about 50 per cent of all machines at the last Show had single solid wire connections, while it was positively known that these would not withstand the road vibrations, and would constantly break. Joints made by twisting the wire around clamping screws were also to be condemned. They certainly made very fine castings in France. In the line of tires there seemed to be a tendency to adopt a square rubber tread, and some manufacturers incorporated a steel band in the tread. The whole Paris Show was pervaded with Mercedes ideas.

Mr. Bourne thought that the foreign designs were at present in the lead. He owned a Mercedes machine, and kept a chauffeur to drive it, and he had so far never been delayed on the road. During the rest of the evening most of the discussions centred around this machine. It was generally admitted that it was a fine piece of mechanism, but some of the speakers thought that it was too complicated to give satisfaction except in the hands of a "past grand master" chauffeur. Mr. Birdsall said that the mechanically operated inlet valve was more noiseless than a suction valve, if designed to make it so. The Mercedes intake valve operating cams were designed to secure noiseless operation at a sacrifice in power, and it had been found that by slightly altering the profile of these cams the power of a 35 horse power Mercedes motor could be increased to 42 horse power, but the feature of noiseless operation was lost. One objection to a four cylinder engine was that all the operating parts of all four cylinders had to be timed exactly alike, or else the power would be much reduced. This adjustment was not by means an easy matter. Fortunately all the cams on both of the cam shafts of the Mercedes machine were integral with the shaft, and that part was therefore completely fool proof. Otherwise, he thought if the machine was taken

to pieces by the average chauffeur that would be the end of it, as far as efficient operation was concerned, for to accurately adjust twelve cams and about twenty-four springs would be too much of a job for the average automobile driver.

Robert L. Niles gave a rather humorous talk toward the end of the discussion. He said that he had been rather disappointed at the Show in not finding what he wanted. He said he wouldn't give 5 cents for the $12,000 imported machines, mentioned by one of the speakers, that could only be driven by $150 a month chauffeurs. When he got an automobile he would want to know that he could drive it himself and also discover for himself what ailed the machine if it should become stalled on the road. A certain gentleman who some time ago had bought a $12,000 German machine had just received notice from the factory that it would be advisable for him to send his chauffeur over there for a course of instruction in the operation and care of the vehicle. Now, he thought that the number of those who could afford the luxury of a $12,000 automobile and of engaging a high salaried chauffeur and then sending him abroad at their expense to take a course of instruction in automobile driving was rather small. It ought to be possible to produce a good machine for $1,500 or $2,000 at the outside. In wandering around at the Show he had observed that orders were taken for vehicles which had never yet moved an inch under their own power. One particular vehicle he had in mind had been taken out at night time, and the owners had been surprised to actually see it mote. In regard to the machines exhibited by the older manufacturers, one prominent make, which he named, seemed to be a great bargain at the price, but what deterred him from buying it was the thought that if anything should ever happen to the exhaust valve what a job it would be to get at the thing. Of course, the manufacturers said that the valve never needed any attention, but he thought he knew better. Two other American makes which he named seemed to have quite a number of points in their favor and to be quite desirable possessions if it wasn't for the inaccessibility of their valves and their ungainly appearance.

Emerson Brooks spoke of his experience in introducing the manufacture of aluminum automobile bodies in this country. The class of work differed widely from what they had been accustomed to before, and he met many discourgements at first. It was not known just what class of workmen—tinsmiths, sheet metal workers, coppersmiths, etc.—would be able to best do the work, but finally the problem was solved satisfactorily. He did not claim that they had introduced any novel ideas in aluminum body construction, but built bodies on the lines laid down by the best French builders, of strictly first class workmanship, and he was complimented on their product by M. Rothschild.

...OUR... FOREIGN EXCHANGES

Some Features of the 1903 Mercedes

Since French manufacturers have taken so generally to copying the 1902 Mercedes car a great deal of interest has naturally been aroused concerning this machine among automobilists of all countries. The 1903 model of this car is not yet out, and deliveries in this country will not be made before next December, we understand, but a number of details of the new model were published in a recent issue of a German automobile publication, upon which the following notes are based.

It is the intention of the Daimler Company, the manufacturers of the Mercedes, to confine themselves to two sizes of vehicles, one to be of 18 to 25 horse power and the other of 60 horse power, the motors of both to be four cylinder ones. The lower powered car will weigh, equipped with touring body, between 750 and 800 kilograms (1,650 and 1,760 pounds). The frame supporting the machinery is of pressed steel.

The change speed gear has been altered in design, particularly as regards the operating mechanism. It will be remembered that in the 1902 Mercedes the change gear lever worked in the slots of an H-shaped grid, and that the lever at its lower end carried a gear sector, the teeth of which could be made to engage with the teeth of one of the other of two racks, each of which controlled one pair of the sliding gears. With the new arrangement the gears are shifted by means of a disk cam which permits the four forward speeds to be engaged successively by a simple forward movement of the change gear lever. The same lever permits of bringing the reverse gear into place, moving the lever to the rear of the neutral position, resulting in an intermediate pinion being interposed between the pinion and gear for the low speed. This change in design has therefore been made with the object of securing a simple one lever change gear control, a feature common to most of the French and American touring car models of 1902.

Another improvement in the new model relates to the friction clutch. The Mercedes machines have always been equipped with expanding ring clutches, as distinguished from conical clutches, and the new clutch is of the same general type. The expanding ring part, mounted on its shaft, the operating sleeve and the flanged coupling for the clutch shaft are shown in Fig. 1.

Fig. 1.

The expanding ring will be seen to be provided with a very broad face and to be split at one part of its circumference. The ends of the ring at the opening can be forced away from each other by means of a lever pivoted near the rim of the ring, at one side of the opening, and provided at its opposite end with a curved rack. The clutch shaft is provided with spiral projections, and an operating sleeve for the clutch, which is provided with internal spiral grooves to engage with these projections, is slipped over the clutch shaft. At one end the sleeve is cut with a series

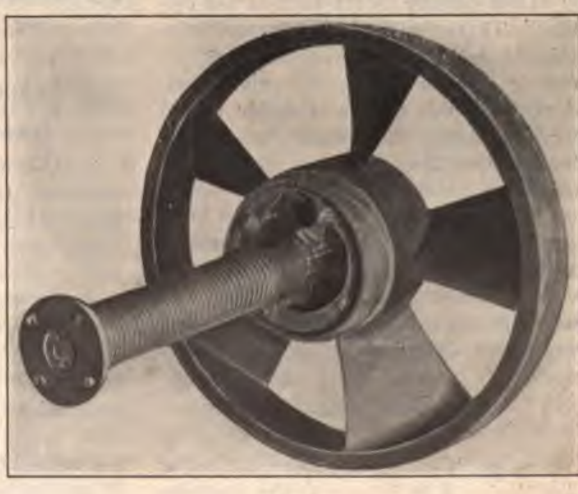


Fig. 2.

of gear teeth adapted to engage with the teeth of the curved rack above referred to, and at the opposite end it is provided with a grooved collar for the shifting fork. It is, of course, readily seen that if the sleeve is shifted along the shaft the spiral projections and grooves cause it to rotate slightly around its axis, and through the in-

FIG. 3.

termediary of the gear teeth upon it and the curved rack, to transmit an expanding motion to the ring or drum. It will be noticed that the outer surface of the drum has oil grooves cut upon it.

The friction clutch, flywheel and fan for the radiator are built together, as shown in Fig. 2. The blades of the fan constitute the spokes of the flywheel, and the rim of the flywheel is very thin. The clutch is normally held in engagement by a coiled spring, and can be disengaged in the usual manner by pressure on a pedal.

The cylinders of the engine are built in pairs, and one pair of these cylinders, as well as one of the pistons and connecting rods, is shown in Fig. 3. The most apparent change from the previous design consists undoubtedly in the placing of the inlet valves directly in the head of the cylinders. These valves are operated mechanically, as before, but no details of the operating mechanism are yet given out. The result of this change in design is that the cylinders have valve boxes on one side only, and that the ignition plugs are fastened directly into the cylinder wall. The axles of the new models are said to be of T section, instead of being tubular as in last year's model, and the ball bearings in the gear box have been retained. The honeycomb radiator of the new models has already been described in THE HORSELESS AGE.

An automobile club has been formed at Milan, Italy, to be known as the Automobile Club of Lombardy.

Automobiles and Motor Cycles Under the New German Tariff.

The new tariff law which was adopted by the German Reichstag on December 15 last considerably increases the tariff duty on automobiles and motor cycles. Under the old tariff, still in force, automobiles of foreign manufacture introduced into Germany are subject to a tariff duty of 150 marks apiece, which corresponds to about 3 per cent. of the average retail price. Motor cycles have to be paid duty on as "fine iron manufactures," at the rate of 24 marks per 100 kilogs. (220 pounds), which corresponds to about 2 to 2½ per cent. of the retail value. The paragraph of the new tariff law relating to motor vehicles of all kinds reads as follows: Vehicles which are not intended to run on tracks (with the exception of marine conveyances) are dutiable, according to weight, as follows: When weighing

	Per 100 Kilogs.
50 kilogs, or less	150 marks
50—100 kilogs	120 marks
100—250 kilogs	90 marks
250—500 kilogs	60 marks
500—1,000 kilogs	40 marks
1,000 or more	20 marks

The tariff rates have been graded to make the duty fairly uniform for vehicles of all weights. The duty on a motor bicycle would be about $20, that on a runabout about $60, and that on a touring car about $100.

The tariff on pneumatic tires has been greatly increased. The rate used to be 40 marks per 100 kilogs (about $5 per 100 pounds), but it has been raised to 100 marks per 100 kilogs.

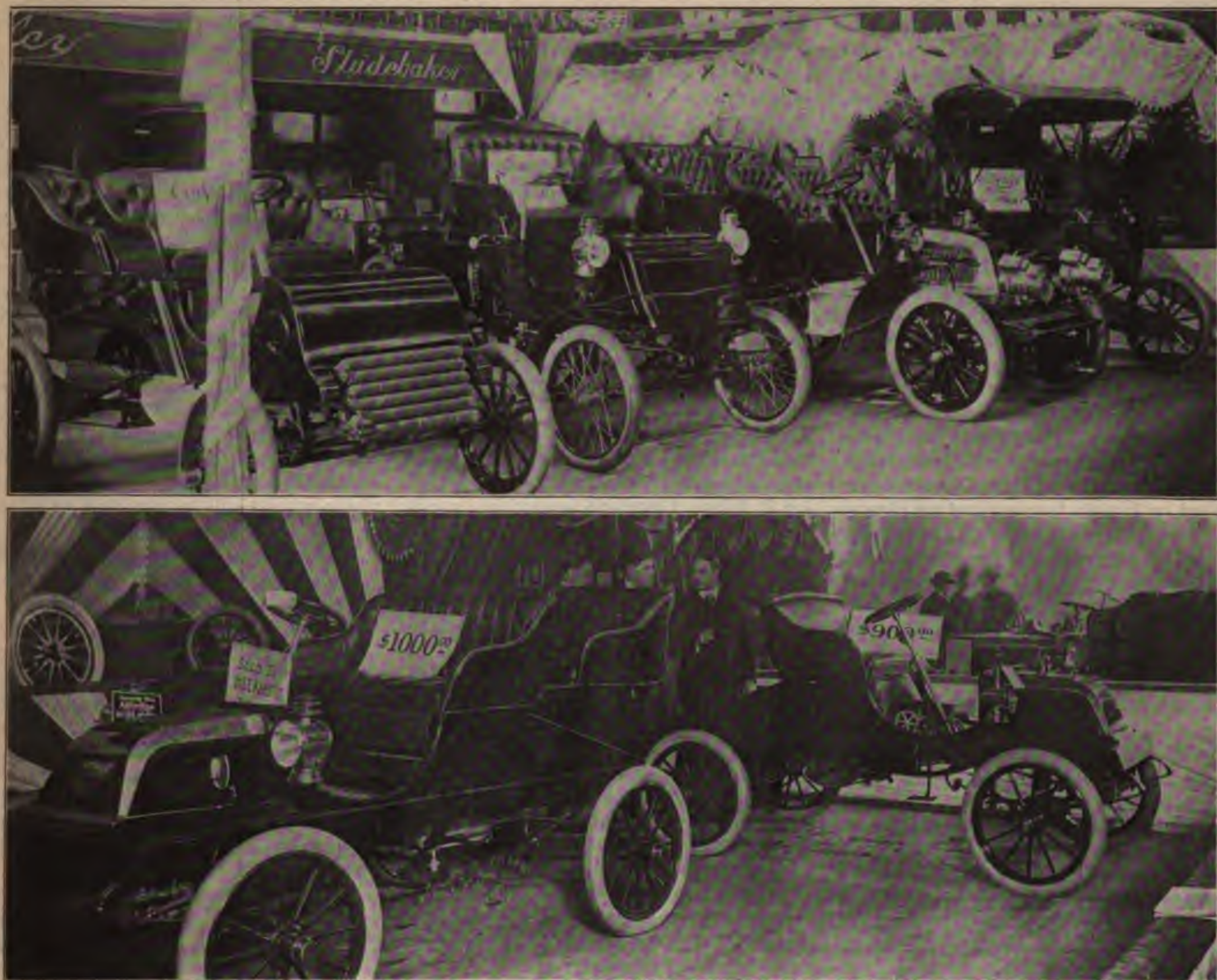
Lubrication in the New 12 Horse Power De Dion Engine.

In their new double cylinder engine De Dion & Bouton have abandoned splash lubrication. On the under side of the crank chamber an oil well is formed into which all oil dropping from the crank shaft bearings, connecting rod ends, etc., runs, and whence it is pumped by a small rotary pump, driven by worm and wheel off the half time shaft, to a lubricating tank, which also acts as an air vessel, set close to the cylinders on the side opposite the valve boxes. The oil, under the force of gravity and the pump pressure through the air vessel, descends by two feed pipes to leads formed in the crank cha[...] casting over the centre of the two [...] crank shaft bearings. The crank sh[...] drilled radially and centrally, and th[...] passes through the leads thus forme[...] similar leads in crank arms and crank[...] for the supply of the connecting rod [...] bearings, and thence by a lead drill[...] the centre of the connecting rods fo[...] supply of the gudgeon pin bearings i[...] pistons.

Not satisfied with providing their [...] shaft bearings with lubrication in this [...] they have similarly fitted their gear [...] so that all the bearings of the primar[...] secondary gear shafts are lubricated i[...] above manner. The rotary pump fo[...] duty is worm and wheel, driven o[...] primary gear shaft, the end of the su[...] pipe being placed an inch or so abov[...] bottom of the differential gear cas[...] which point all the oil in the change [...] and differential gear case drains.

Proposed Motor Cycle Conte[...]

It has been definitely decided that a [...] of the trustworthiness of motor [...] shall be held in England during 190[...] the terms which have been agreed [...] between the Automobile Club of [...] Britain and the manufacturers and s[...] of this class of vehicle have just been [...]lished. Rules and regulations wi[...] drawn up by a committee compos[...] ten members of the club executive a[...] members of the trade. The distan[...] be covered by the trial must be at [...] a thousand miles, with a minimum pe[...] of a hundred miles, and the total tim[...] cupied is not to exceed a fortnigh[...] twelve running days. No maker w[...] allowed to enter more than three [...]chines of a given type, while the si[...] the engines is to be limited to a sta[...] pattern of 3 horse power. A [...] which has yet to be decided is whet[...] tourists' section shall be included i[...] trial or not. It appears that the ma[...]turers are opposed to such an arr[...]ment, contending that, however g[...] machine may be, if ridden by a nov[...] is liable to come to grief, and tha[...]ponents will not be slow to take a[...]tage of such a breakdown, notwith[...]ing the fact that the cause might be [...] due to the rider and not to the ma[...] Obviously, however, this is a very [...] view to take. As Professor Boy[...] pointed out, if the public saw that [...] machines could be successfully [...] through a trial by a novice as aga[...] professional, they would at once arr[...] the conclusion that it was an easy [...] to manage them, and consequently t[...]mand would increase greatly. If, o[...] other hand, the machines were ridd[...] professional mechanics, the opinion [...] gain ground that mechanical expe[...] was necessary to use such machines [...] success. The question of a tourists [...]tion has been left for the committee [...]cide.



SOME VIEWS OF THE CLEVELAND SHOW.

The Cleveland Show.

The show held last week at Grays' Armory in Cleveland was well patronized by exhibitors and well attended by the public. Nominally all the exhibits were made by local representatives of the various manufacturers, but it was observed that the attendants at the stands were mostly men from the factories. The absence of three leading local manufacturers' exhibits—Peerless, Baker and White—was a notable feature.

The show opened on Monday evening at 7 o'clock. As may be seen from the list of exhibitors in our last issue, leading manufacturers of automobiles were well represented. The stands were on the whole tastily decorated, and every space was fenced in with guard railings of 2x4 inch scantlings.

A musical program was rendered at the Armory each evening, and one night during the week (Thursday) the promoters of the show gave a Dutch lunch and vaudeville exhibition after the show proper had closed. An amusing feature in connection with the show was the method employed of proclaiming the closing hour. At about half-past 10 practically all the exhibitors began to blow their automobile horns, and kept it up until the crowd had left the building. The visitors immediately grasped the meaning of the signal, and the evacuation of the Armory proceeded rapidly.

There were few machines shown that were not to be seen at the Madison Square Garden Show. The Geneva Automobile and Manufacturing Company presented a new car, a steam touring car with tonneau body. This vehicle possesses all of the features which lately seem to be regarded by the steam branch of the industry as essentials in a touring car equipped with that form of motive power. It has a kerosene burner (vaporizers for kerosene or gasoline are furnished at option), a semi-flash boiler and a condenser of special design. The boiler is located under a bonnet in front and the engine is arranged horizontally and drives the rear axle directly through spur gearing, the same as the Terwilliger, described in another column of this issue. The car weighs 1,600 pounds with tanks filled, and is provided with wood wheels and 30x3½ clincher tires. At the Geneva stand were also shown a Yale tonneau and a Rambler runabout.

The Union automobile, manufactured by the Union Automobile Company, of Union City, Ind., was exhibited to the public for the first time. The car was described in our issue of December 24, 1902.

The F. B. Stearns Company had on show one of their regular 24 horse power touring cars and a 12 horse power "Suburban" car. The Winton exhibit included the Bullet, the regular touring car model, and a chassis of same. The Shelby Motor Car Company had a very creditable exhibit and the various lines of the International Motor Car Company were represented through a number of Cleveland agencies.

The Olds Motor Works, represented by R. R. Owen, manager of the Cleveland store, exhibited one runabout, one tonneau and one enclosed doctor's carriage. At the same space were shown Dietz automobile lamps and Pan-American polish. Foster & Co., of 399 Erie street, Cleveland, exhibited a General runabout and tonneau and an Ajax electric runabout. The Rogers & Thacher Manufacturing Company, of 2692 St. Clair street, Cleveland, exhibited a new 35 brake horse power touring car weighing 2,200 pounds. This vehicle has only just been completed and no description of the vehicle could yet be had. The Ohio Motor Car Company, 317 Huron street, Cleveland, exhibited a Northern runabout and a chassis of the same vehicle;

also a Toledo gasoline touring car, two National electric runabouts and a park trap, and a Buffalo electric Stanhope. The Hoffman Automobile Manufacturing Company exhibited one steam runabout with flash boiler and a gasoline tonneau. The Shelby Motor Car Company exhibited one runabout and one tonneau.

The Cleveland Automobile and Supply Company had an exhibit consisting of one Waverley Stanhope, one delivery wagon and one model 22; one Locomobile Stanhope, two gasoline touring cars and one steam runabout; one Columbia electric brougham; one Cadillac gasoline car with tonneau; one Searchmont tonneau; one Studebaker electric carriage with top; one Orient buckboard; one Marsh motor bicycle and a line of accessories. H. S. Moore, 193 Crawford road, Cleveland, exhibited an Elmore tonneau and an Elmore runabout. Warwick & Bissell, temporarily located at 317 Huron street, exhibited a Thomas tonneau with sliding gear transmission. Frank P. Illsley, of Chicago, exhibited an autocar tonneau and a Stanhope with top. Hugh B. Wick & Co., of Youngstown, Ohio, exhibited a gasoline touring car.

PARTS EXHIBITS.

The exhibit of the Westinghouse Company, of Pittsburg, consisting of motors, controllers, instruments and charging apparatus, was in charge of G. F. Adams. The exhibit of the Twentieth Century Manufacturing Company, comprising automobile lamps in various sizes, was in charge of Thomas N. Dunham. The Veeder Manufacturing Company showed odometers, cyclometers, tachometers and counters, and were represented by D. J. Post and E. J. Biddell. The Kelly Handle Bar Company exhibited their gasoline burners, the stand being in charge of Charles Weaver. John H. Graham exhibited bells made by the New Departure Bell Company, being represented at the show by C. A. Hoagland. Collister & Sayle, of Cleveland, made an exhibit of auto accessories, bicycles and phonographs. D. E. Foote Rubber Company, a branch of the International Auto and Vehicle Tire Company, exhibited a full line of that company's tires, the exhibit being in charge of Mr. Foote. The Fisk Rubber Company was represented by C. A. Broadwell, manager of their Detroit house, and exhibited a full line of tires. The tire exhibit of B. F. Goodrich Company was in charge of W. Will. The Sherwin-Williams Paint Company, of Cleveland, made an exhibit of large color cards and samples and were represented by W. B. Wise. The exhibit of the Diamond Rubber Company was made through their Cleveland branch and was in charge of F. E. Taylor. L. J. Miller, jobber in auto materials, had an exhibit of this line. The National Carbon Company's exhibit, consisting of batteries and other ignition parts, was in charge of E. J. Climo. The Pittsburg Reduction Company exhibited automobile parts made of aluminum, from small brackets to crank and gear cases and parts of bodies.

The show was attended by many agents and prospective buyers, and according to the reports of the exhibitors the amount of business done was considerable. In fact, THE HORSELESS AGE representative did not meet a single one who was dissatisfied.

N. A. A. M. Elects Officers.

The executive committee of the N. A. A. M. held a meeting at their headquarters in New York on February 4. H. Ward Leonard, J. Wellesley Allison and Percy Owen were appointed a committee to nominate officers for the ensuing year. They reported as follows: Milton J. Budlong, Hartford, president; H. Ward Leonard, New York, first vice president; Windsor T. White, Cleveland, second vice president; Charles Clifton, Buffalo, third vice president; Percy Owen, New York, treasurer. They were elected and Harry Unwin was reappointed as secretary.

John Brisben Walker, chairman of the Good Roads Convention to be held at Chicago, presented his report, which showed that 22,000 invitations will be sent out.

It was voted to retain the association's headquarters in New York, to incorporate the association and to hold a climbing and stopping contest on Fort George Hill, New York. Arrangements for the contest were referred to the technical committee to be appointed.

A special meeting of the association to revise the constitution and by-laws has been called for March 18.

The president was authorized to appoint the various regular committees.

Secretary Unwin left the city on February 7 for Chicago on business connected with exhibits at the Automobile Show.

Washington's Birthday Run to Philadelphia.

The runs and tours committee of the A. C. A. announce that owing to the poor condition of the roads the Lakewood run, scheduled for February 21 to 23, has been declared off. In its stead a run will be made to Philadelphia.

Members are invited to rendezvous at the Hotel Bellevue, Philadelphia, on Saturday, February 21, at 8 p. m. for dinner. Sunday is to be spent in Philadelphia, and the return to New York is to be made (unpaced) on Monday, February 23. Members who do not care to go by automobile are invited to attend the dinner on Saturday night and spend Sunday in Philadelphia.

The route will be via Twenty-third street ferry to Jersey City, Hudson County boulevard to Bergen Point, ferry to Port Richmond, across Staten Island to Tottenville, ferry to Perth Amboy, to New Brunswick, Trenton, Bordentown, Columbus, Burlington, Camden and ferry to Philadelphia. Arrangements will be made for boats at convenient intervals, both on the Port Richmond and Tottenville ferries.

The Automobile Club of Philadelphia has extended to members of the A. C. A. the courtesies of its club and will arrange for a run on Sunday, February 22, on the Lancaster turnpike, through Ardmore, Bryn Mawr to West Chester (25 miles), over excellent roads.

Good Roads Meeting.

An International Congress on Good Roads is to be held in connection with the annual meeting of the American Road Makers at Detroit, Mich., February 13 and 14. The Trunk Line Association has granted special rates to the members of this conference and to the members of the American Road Makers, which means that transportation will be furnished to all such at the rate of a fare and a third.

It is announced that the Brownlow bill, which is now before Congress, will be thoroughly dissected and a substitute will be drawn up and put into the hands of a national committee with instructions to secure the necessary amendments to the Brownlow bill as it now stands. It is claimed that it contains many defects and does not sufficiently safeguard the Federal interests. Its good features were taken from the State Aid bill which has been in operation in New York State for several years to such good advantage, and it is hoped and expected that the revised bill which will be favored by the American Road Makers will be a more perfect copy of the New York State Aid bill.

Oil Cooling of Gasoline Engines.

The liability to freeze of the cooling water of gasoline engines has led to the placing on the market of a number of antifreeze solutions which are quite generally used. The Hart-Parr Company, of Charles City, Ia., have recently brought out a gasoline traction engine in which they employ oil for cooling, which is, of course, entirely unaffected by cold. The cooling system consists of a tank connected to the top and bottom of the cylinder jacket, and a small centrifugal pump which causes a rapid circulation of the oil through the jackets and tank. It is stated that the whole system is hermetically closed and there is absolutely no loss of oil. A large number of tubes pass vertically through the tank and open at the top into a conical space below a short stack which surmounts the tank. The exhaust from the engine is led into this conical space and is turned upward into the stack, which induces a rapid upward flow of air through the tubes. This cooler, we are informed, has been successfully applied to engines of 40 horse power. For small engines the pump is not needed. For pleasure automobiles the system is apparently not adapted, as it would be impracticable to direct the exhaust upward. Another disadvantage of using oil for cooling would be the uncleanliness.

INOR ENTION

Moore is arranging to open an
y barn in Walla Walla, Wash.

Merrill is forming a company to
the automobile business in Spo-
sh.

ngs County Club, Brooklyn, N. Y.,
an auxiliary branch known as the
unty Automobile Club.

fice of the Locomobile Company
ica will be removed from New
Bridgeport, Conn., next spring.

eveland (Ohio) Automobile Club
will elect officers on the second
in February, instead of late in

ow Portable Electric Company
sed their Philadelphia office and
after be represented there by John
cer.

Macy & Co., New York, will open
1 a permanent salesroom, where
show all makes of machines un-
oof.

anker Brothers Company are to
ie Century gasoline car at their
nents in Pittsburg, Philadelphia
York.

C. A. and N. A. A. M. have re-
check for $10,000 each on account
hare in the profits of the last New
tomobile Show.

ioneer Automobile Company has
lease for the entire four floors of
ling at 54 West Thirty-eighth
w York.

is said to be on for the combina-
the Fredonia Manufacturing
and the Hugh B. Wick Com-
ungstown, Ohio.

ated that J. F. Lamb, of Grand
Mich., is trying to interest capi-
his automobile patents and to
a factory at Dayton, Ohio.

ited Motor and Vehicle Company,
N. J., has been incorporated by
V. Anston, Austin E. Kirby and
Hughes. Capital stock, $100,000.

oodyear Tire and Rubber Com-
occupy its new building at Akron,
hin two weeks. Some of the auto
g machinery has already been in-

tar Automobile Manufacturing
Cleveland, Ohio, have leased the
at 184 Kinsman street, where they
ufacture the Star gasoline auto-

illette Athletic Goods Corpora-
Hartford, Conn., has been organ-
a capital stock of $3,000, to
re and deal in motor cycles,
es, etc. The officers are: Presi-
treasurer, Norman Gillette; vice
Harrison B. Freeman, Jr.; sec-
hn J. McKone.

The Smith Truss Company, of Topeka. Kan., are erecting a large shop for the manufacture of automobiles. They have a two cylinder 8 horse power gasoline machine.

The Cleveland Distributing Company, of 288 Bank street, Cleveland, Ohio, are making a specialty of steel tubing for automobile construction, of which they carry a large stock on hand.

Ralph C. Lewis, of Boston. has associated himself with H. Loranus Davis and will continue the automobile business at 66 and 68 Stanhope street, under the firm name of "Automobile Headquarters."

Sidney B. Bowman and George R. Bidwell, New York, started on January 30 for a trip to Washington and return to test the 20 horse power La France gasoline vehicle made by the La France Fire Engine Company.

In the specifications of the Locomobile touring car on page 129 in our issue of January 21, the frame should have been described as of steel instead of armored wood and the spark as automatically controlled instead of hand controlled.

R. P. Scott, of Cadiz, Ohio, gave a lecture before the Farmers' Institute, at Freeport, Ohio, on "How to Have Good Roads Without Costing a Cent," which rather fanciful object he thought could be achieved by means of steel roadways.

The Dayton Electrical Manufacturing Company have purchased patents Nos. 634,430, 663,653, 647,946 and 675,557 from Walter H. Cotton and Albert Kunze, of Chicago. These patents relate to the Cotton magnetic ignition plug.

At the annual election of the Sintz Gas Engine Company, Detroit, Mich., E. E. Barber and James Bayne, Grand Rapids, were retired from the directorate and E. B. Finch was elected to succeed Oro J. Mulford as secretary. The company is arranging to manufacture automobiles on a large scale.

S. F. Heath, who for the past three and one-half years has been sales and advertising manager of the Wisconsin Wheel Works, has resigned and accepted a similar position with the E. R. Thomas Motor Company, of Buffalo, N. Y. Mr. Heath will have charge of the company's exhibit at the Chicago show.

H. T. Eisenberg, of Chicago, has just returned from the island of Jamaica, where he had some interesting touring experiences with a Locomobile runabout. He made one run from Kingston to Newcastle over the military road. The run is a hard climb of 12 miles, 4,000 feet being ascended in this distance, but it was done in just four hours. Another trip was made to Port Antonio from Jamaica in four hours, which is said to be a little less than the railroad running time. Mr. Eisenberg states that the machine created a great deal of excitement on the island, but that, so far as business is concerned, there are few people who have money to invest in automobiles.

The Electric Vehicle Company, of Hartford, Conn., have opened salesrooms at 134 to 138 West Thirty-ninth street and an office at 100 Broadway, New York.

Charles H. Martin, formerly New York representative of Stevens-Duryea automobiles, is now associated with the Knox Company at their New York agency, on Thirty-eighth street, near Broadway.

It is reported that the Toronto (Canada) Automobile and Gas Engine Company have bought the Essex Manufacturing Company's building and that they will at once put it into shape for making their specialties.

A project is reported to be on foot to organize the Scranton (Pa.) Automobile Company. J. H. Brooks, A. P. Bedford, C. M. Florey and others are interested and present plans are to have a salesroom, livery and repair shop, and ultimately to engage in manufacturing.

The Chillicothe Motor, Storage and Manufacturing Company, Chillicothe, Ohio, has applied for a charter under the laws of South Dakota, with B. F. Gramm and Joseph Schilder as incorporators. The plant is constructed and automobiles will be made after patents taken out by Mr. Gramm.

The Oldsmobile Company, of Detroit, Mich., with W. C. Rands & Co. as managers, have been formed for the exclusive sale of automobiles manufactured by the Olds Motor Works. The business will be conducted temporarily at 254 Woodward avenue, but arrangements are said to have been made to erect a complete garage.

A steam automobile was built by William Siefker, an old German resident of Seymour, Ind., in 1880. It ran on 30 inch cast iron wheels, had a 14 inch fire tube boiler 36 inches high with twenty-one 1½ inch flues and two separate engines, one for each wheel. Coal was used for fuel and a speed of 10 to 12 miles an hour was attained on good roads.

The United States Rapid Vehicle Company, with temporary offices at 7 and 9 Warren street, New York city, has purchased all the patents of Charles E. Duryea and expects to enter the market soon with a number of vehicles built on the Duryea system, the first machine to be a four wheeler for four passengers. Francis D. Carley is president of the new company, Charles E. Duryea vice president, and Henry van Arsdale secretary and general manager.

Members of the Massachusetts Automobile Club have formed the New England Automobile Association and will hold an automobile show at Mechanics Hall, Boston, February 24 to 28. The following officers have been elected: Col. James T. Soutter, Boston, president; Col. Elliot C. Lee, Brookline, vice president; Dr. Julian Chase, Pawtucket, R. I., vice president; Col. Wm. J. Hoyt, secretary, Manchester, N. H. J. A. Tirrell, 8 Congress street, Boston, holds the office of treasurer and is in charge of affairs connected with the

show. There will thus be two shows in Boston in the near future.

The Tennant Auto Tire Company, East Orange, N. J., has been organized to manufacture tires for autos along the line of patents granted to Irvin Tennant. The capital stock is $300,000, which is held by Frederic Lee Palmer, Frank C. Ferguson and Charles O. Geyer.

LEGISLATIVE AND LEGAL.

New Automobile Bill for Massachusetts.

Judge Henry S. Dewey, of Boston, has filed with the clerk of the House of Representatives of the Massachusetts Legislature a bill which asks for power to be granted the Governor and council to create a board in automobile registration, to comprise three persons. The bill provides that every owner of an automobile be obliged to give his name, residence, description of the vehicle, seating capacity, type and power of motor used. The board has the power to refuse a certificate if automobiles are not up to the standard.

Every owner must file a certificate as to his ability to manipulate one of these machines. When found, after examination, lacking in physical or mental qualities, the board shall declare the owner or operator of the machine unfit for a certificate. Each operator or owner of an automobile shall submit to trials and examination before a certificate (good for one year) is issued.

Each automobile shall have two brakes, one for going forward and the other for going backward. Illuminated numbers are prescribed for the side lights of each vehicle, and a white light is insisted upon for the front and a red light for the rear end.

The limit of speed is placed at twenty miles an hour in outlying districts and twelve miles an hour in the business or congested districts. Automobilists are cautioned not to scare horses. The police may command an automobilist to stop.

Should there be an accident and the automobilist run away to escape responsibility, his certificate must be forfeited. The penalties fixed for a violation of the law are a fine of $200 and imprisonment for ten days for each offense and cancelling the certificate of registration.

The Alabama Senate on February 3 passed resolutions indorsing the Brownlow public road bill now before Congress.

The Spaulding Automobile and Motor Company, Buffalo, N. Y., are reported to be seeking voluntary dissolution, and a court order has been granted to show cause, on May 1, before R. B. Mahany, referee, why the company should not be dissolved. Nelson B. Baker has been appointed receiver, under a bond of $12,000.

Lloyd Warren, of New York city, was fined $25 at Mineola, L. I., February 3, for automobile speeding on the Jericho turnpike.

The Buffalo (N. Y.) Automobile and Auto-Bi Company has made an application for a voluntary dissolution. The petition shows that the company has no debts.

Otto G. Stolzenfels is suing the Woods Motor Vehicle Company, Buffalo, N. Y., for $10,000 for damages alleged to have been sustained in personal injuries by being knocked from his bicycle on July 5, 1901, by one of the defendant's automobiles.

In the suit for damages brought by Mrs. Dr. Lombard, South Portland, Me., against Flavel Chaplin, Portland, for injuries sustained by being thrown from her carriage by reason of her horse having been frightened by defendant's automobile, complainant was awarded a verdict of $600 on January 31.

The New York Metropolitan Auto Company, W. Butler Duncan, and Blanche Duncan, are being sued by Patrick Eagan for $3,000 damages for injuries received by him, and $430 for the destruction on February 28, 1902, of his hansom cab, which he says was destroyed by an auto belonging to the company and run by the other defendants.

In compliance with a resolution adopted recently by the Lake County (Ill.) Board of Supervisors, a bill regulating the speed of automobiles on public highways has been drawn and will shortly be presented in the Senate by Senator Fuller and in the House by Representative Lyon. Twelve miles an hour, except by special permission, is provided.

In addition to the general automobile bill introduced in the Massachusetts Legislature by Judge Dewey, other bills have been put in as follows: Thomas J. Grady, that drivers be licensed; Robert Clement, that the speed shall be not more than 20 miles per hour outside cities and 12 miles in cities; Robert M. Shaw, that drivers be licensed by the district police, and Frank J. Stanley, that the highest rate of speed allowed for automobiles shall be 12 miles per hour outside cities and 8 miles in cities.

On February 6 sixty-two automobile licenses were applied for at the Bureau of Boiler Inspection, Philadelphia. The licenses are issued under the provisions of the ordinance passed in December. New numbers are furnished to each person who applies for a license. The numbers are on a blue enameled sign 7 inches in length and 4 inches in width. In one corner of the sign is "1903" and at right angles to the date. It is the intention in issuing these licenses annually to change the color each year.

Trade Literature Receiv

Westinghouse Automobile C Outfits—Westinghouse Electric an ufacturing Company, Pittsburg, P

Souvenir of an Inspection Trip by the American Society of Civi neers to the New Terminal of the German Lloyd Steamship Compan eph Dixon Crucible Company, of City, N. J.

Laminated Wood Automobile Guards—American Veneer Comp Jersey City, N. J.

Duryea Motor Vehicles—Duryea Company, Reading, Pa.

Twentieth Century Lights.—Tw Century Manufacturing Company, Warren street, New York.

Pan-American Polish. — Pan-Am Polish Company, 39 Amherst stree Cleveland, Ohio.

Veeder Odometers.—Veeder M turing Company, of Hartford, Conn.

Automobile Lamps.—Gray & Amesbury, Mass.

"Points" for Manufacturers of Gas oline and Oil Engines.—Baker & Co., ark, N. J.

The Alchemistic Symbols—A Brie count of Their Origin and Meanin James Lewis Howe.—Baker & Co., ark, N. J.

Platinum.—Baker & Co., Newark, N

Dyke's No. 0 4 Horse Power Gas Engine.—A. L. Dyke, Linmer Buil St. Louis, Mo.

The Crestmobile.—Crest Manufact Company, of Cambridge, Mass.

The Automotor Gasoline Touring C The Automotor Company, of Sprin Mass.

Brennan Standard Gasoline Mot Brennan Manufacturing Company, of cuse, N. Y.

A. C. A. Matters.

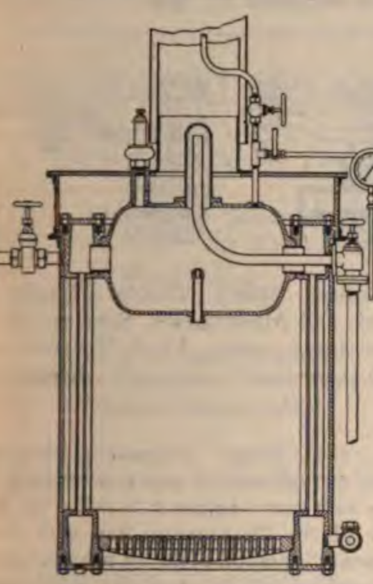
The subject of the lecture at the A. at the last lecture evening, Tu February 10, was "Some Primitive T portation: Dog and Reindeer Drivi Alaska," Tappan Adney, late special respondent in the Klondyke, being th turer.

At the last meeting of the Board of ernors of the A. C. A. the following members were elected: Active—W Rockefeller, James A. Burden, Jr., rence Waterbury, Henry Randolph phen, James C. Ayer, J. McMillan H ton, James E. Woodbridge, John B. T Carleton W. Nason, William E. Ha E. Virgil Neal and Frederick Glass New York; John W. Thompson, hama, Japan, and E. H. Bennett, Bay N. J. Associate—W. E. Harkness, land; Clifford B. Harmon, Philade S. D. Waldron, Warren, Ohio; Willia McKelvy, Easton, Pa., and Alfred Providence, R. I. Robert Walton G of New York, has been proposed for bership.

MOTOR VEHICLE PATENTS..

United States Patents.

718,954. Steam Boiler for Motor Vehicles.—A. D. Smith, of Edinburgh, Scotland. January 20, 1903. Filed July 1, 1901.



No. 718,954.

The invention relates to a vertical water tube boiler with upper and lower multiples in the form of rings of somewhat oblong cross section, the tubes running from the inner ends of the respective multiples, their ends being fixed into the multiples in the usual manner. These multiples of annular form are produced from steel and rolled in the form of weldless rings, and then the internal chamber is turned from the solid to the desired design, thickening the metal toward the outer wall, forming the open end, so as to adapt it for the tap holes to be formed therein for studs by which to securely hold the cover plate ring to close the open side of each multiple. This enables the two sides of each ring to be kept close together, whereby great strength and economy are attained, together with a minimum number of joints.

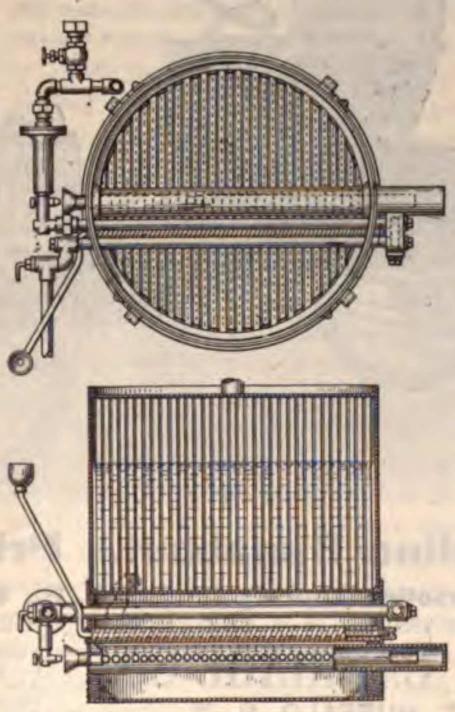
A drum is arranged within the opening formed by the annular multiple having two sides shaped to conform to the inner peripheral wall of the multiple and embracing the wall to form a close fit between these parts. A pair of tubes extends through the connecting walls of the drum and multiple respectively for establishing communication between these elements and a steam pipe leads from the drum for conveying steam to the engine.

718,161. Motor Vehicle.—Oscar H. Schildback, of South Bend, Ind. January 13, 1903. Filed March 28, 1902.

The patent relates to chain adjusting means for electrically propelled automobiles. The electric motor is hung from the spring suspended body of the vehicle through the intermediary of a support carried by the body and having longitudinally extending grooves. The motor is provided with end supports with lugs or projections adapted to enter into the grooves, and also having slots intermediate of the lugs or projections; bolts are passed through the slots and bars, whereby the motor may be moved adjustably and removably on and from the support in a direction longitudinally of the vehicle body.

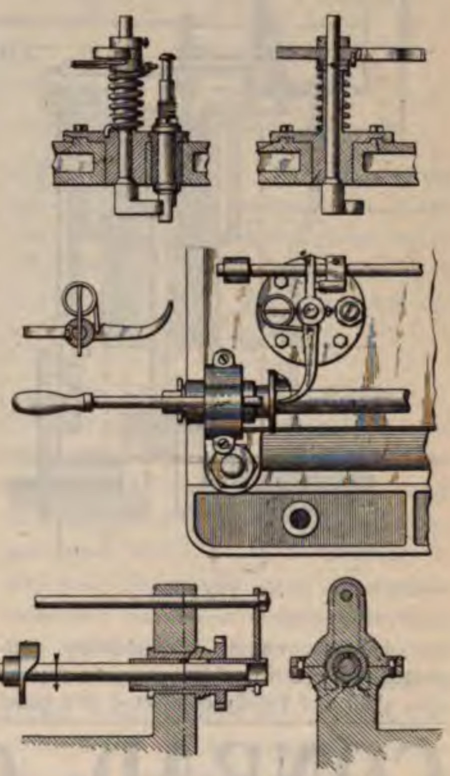
719,072. Spark Igniting Mechanism for Explosive Engines.—C. G. Annesley, of Buffalo, N. Y. January 27, 1903. Filed September 13, 1901.

The igniter is of the hammer break type and is provided with means for varying the time of the spark. The two electrodes pass through the head of the cylinder. The movable electrode is normally held out of contact with the stationary electrode and against a stop on the outside of the cylinder head by means of a coiled spring surrounding the electrode stem guide. One end of this spring passes through the stem and the other end is held stationary in the plug through which the stem passes. The movable electrode receives its motion from a face cam on a cam shaft running across the head of the cylinder. This cam engages with a cam arm mounted loosely on the stem of the movable electrode, but transmits motion to it through a trigger spring. When the cam engages the cam arm, turning it around its pivot, the trigger spring is put under torsion, and as soon as this torsion exceeds that of the coiled spring holding the electrodes apart, the movable electrode is turned around its centre and brought in contact with the stationary electrode. Any farther motion of the cam arm is taken up by the trigger spring. When the high part of the cam passes the cam arm the electrodes are suddenly separated by the force of the coiled spring.



No. 717,754.

The igniter cam shaft running across the cylinder head is driven from the crank



No. 719,072.

shaft by a chain. For advancing or retarding the spark the sprocket on the cam shaft is connected to the latter by means of a shifting sleeve with a spiral slot as shown in the diagram. The sprocket is fastened to the sleeve by a straight key and is held from longitudinal movement by a thrust bearing. The sleeve drives the cam shaft by means of a pin working in a spiral slot in the sleeve. It is of course readily understood that if the sleeve is shifted in the direction of its axis the tripping of the igniter will occur earlier or later with respect to the cycle of the engine, according to the direction of motion of the sleeve.

719,199. Internal Combustion Engine.—C. E. Dawson, of Hythe, England. January 27, 1903. Filed December 10, 1900.

719,140. Steam Boiler.—Frederick M. Ramsdell, of Worcester, Mass. January 27, 1903. Filed May 10, 1901.

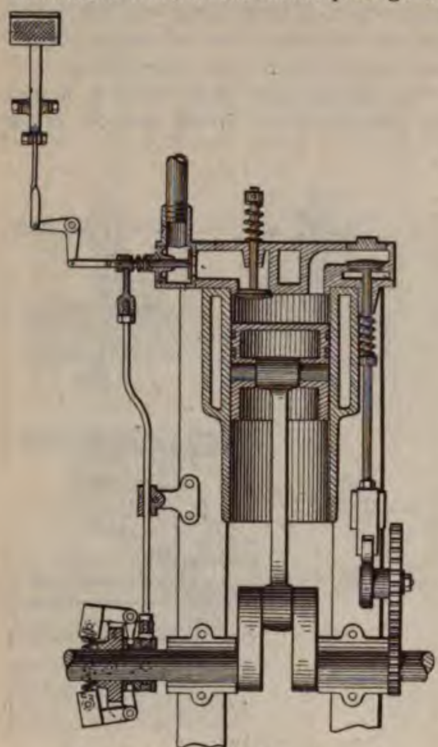
718,481. Internal Combustion Engine.—W. L. Davis and Alfred Soames, of County of Surrey, England. January 13, 1903. Filed June 27, 1902.

718,933. Explosive Engine.—Hobert J. Hurd, of Bridgeport, Conn., January 20, 1903. Filed April 5, 1901.

719,328. Governor and Controlling Mech-

anism.—Ralph B. Haim, of Los Angeles, Cal. January 27, 1903. Filed July 30, 1902.

A throttle valve in the intake passage of

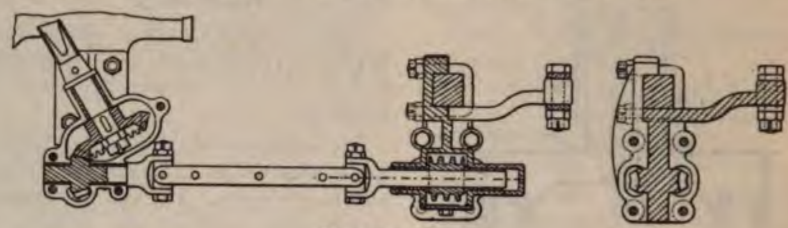


No. 719,328.

an explosion engine is yieldingly connected to a centrifugal governor on the engine shaft and rigidly connected to a pedal under the foot of the operator. Ordinarily the centrifugal governor tends to close the throttle valve and to limit the speed of the engine to a certain predetermined value. Pressure on the pedal counteracts and annuls the effect of the centrifugal governor on the throttle valve.

719,171. Steering Mechanism for Motor Vehicles.—Herbert Austin, of Birmingham, England. January 27, 1903. Filed April 23, 1902.

From the inclined steering shaft the motion is transmitted through a set of bevel gears, enclosed in a case, to a shaft with universal joints, the other end of which carries a worm engaging with a worm wheel on the lower end of the steering pivot. Worm and worm wheel are, of course, also inclosed in a case. The advantage of this construction over the ordinary arrangement is that there is practically no endwise force transmitted through the links and their joints.



No. 719,171.

719,418. Electric Accumulator Plate.—Auguste Bainville, Nanterre, France. February 3, 1903. Filed July 14, 1902.

719,513. Multi-Cylinder Rotary Engin —William Scantlebury, Washington, D. February 3, 1903. Filed August 22, 1901.

719,536. Vaporizer or Carburetor for E plosive Engines.—Henry W. Tuttle, Phi adelphia, Pa. February 3, 1903. Fil January 13, 1902.

719,547. Explosive Engine.—John Wi loughby, Brooklyn, N. Y. February 1903. Filed March 26, 1901.

719,778. Storage Battery Tank.—Bru Ford, Philadelphia, Pa. February 3, 190 Filed December 11, 1902.

719,822. Motor Vehicle. — Shirley S Lewis and Albert Lewis, Syracuse, N. Y. February 3, 1903. Filed November 23, 1900.

At the Chicago Automobile Show, we hear, an automobile paper is to be given free with every entrance ticket. The success of the "frankfurter free with every schooner" method of doing business seems to have roused the emulative spirit of the show management.

THE HORSELESS AGE

...EVERY WEDNESDAY...

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The Show Question Needs Further Attention.

The announcement of automobile shows in all the larger cities of the East implies that show promoters regard the rule of the National Association of Automobile Manufacturers, by which its members agree to exhibit at none but the two National shows, at New York and Chicago respectively, as practically broken down. At least eleven different shows are on the program the present winter, the fourth being now in progress in Chicago. It is true that at all the shows outside of those at New York and Chicago spaces are taken by agents only, or by manufacturers just entering the field who are not yet members of the Manufacturers' Association. There has evidently been some complaint from members of the N. A. A. M. at the unchecked promotion of shows, as may be inferred from circular letters sent out by the association some time ago to active and associate members, stating that both classes of members were expected to strictly adhere to the association's rule regarding shows and not take any space at any other than the two recognized shows, and that all expenses connected with exhibits at other than these authorized shows were to be borne entirely by the agents in whose name the space was booked.

From the two non-authorized shows that have been held so far it is perfectly evident that the last recommendation is not lived up to. At most of the stands officers of the manufacturing companies were in attendance, which fact alone suffices to convince us that the expenses were not borne solely by the agents, if they bore any part thereof. The object of the National Association to reduce the show expenses of the manufacturers and to suppress unprofitable shows, has therefore not been entirely successful so far, and the show question deserves further attention on the part of the association. As we pointed out recently, it may not be inadvisable to add one or two to the authorized shows, but to acquiesce in and practically support a show in every city of any prominence will not prove a practical policy.

The Crystal Palace Show.

Although the English automobile trade was divided on the show question last summer and a considerable number of shows are held in England this year, the Crystal Palace Show, which closed on February 7, was fairly representative of the English trade, and exceeded in magnitude anything that has been seen in this line in England in previous years. As usual at English shows, French vehicles were very much in evidence, but the American industry was also well represented, there being five makes of steam, seven of gasoline and three of electric vehicles of American origin on exhibition, besides a great many accessories and parts.

So far as the general impression of the Show is concerned, it was certainly a fine demonstration of the progress of the industry in Great Britain, and in point of variety, number and value of exhibits it compared favorably with the Paris Show in the estimation of many who saw both. There was much complaint about the inadequacy of the railroad facilities to the Crystal Palace, which was the cause of much loss of time.

The actual sales were said to have fallen short of expectations, and many believed March a better time for holding a show than January or February.

A notable feature of the show was the excellent grounds of the Palace, comprising an area of over 200 acres and affording a splendid opportunity for trials and demonstration runs. This feature was fully appreciated by the exhibitors, and about seventy-five cars were kept constantly on hand for visitors' use.

As in the case of the French Show, on

one day of the week (Wednesday) a special admission price was charged, with the object, of course, of making this a day for the higher society. If the show was not as successful as desirable from the standpoint of sales effected, it certainly was a success from the standpoint of quality and number of exhibits and from that of attendance.

The Automobile Club of America's Winter Run.

The decision of the Automobile Club of America to hold a run to Philadelphia on Washington's Birthday, whatever the weather may be, is certainly to be commended, for the run, if the conditions are not the very worst, will certainly do its share in establishing the practicability of automobiles during all seasons of the year. The roads over which the run will lead, according to the itinerary published in our last issue, are mostly in fair condition at this season, and no trouble need be expected on that score. Whether the trip will be a pleasure jaunt or an arduous task will depend mostly upon the weather on that particular day. The Long Island Automobile Club's run on Lincoln's Birthday was favored with almost ideal weather, considering the time of the year, and if the A. C. A. should be equally fortunate in this respect the Philadelphia run ought to prove a great success. However, we believe there is enough enthusiasm in the A. C. A. to make the event a success whether sunshine or rain accompanies it.

The appropriateness of a run of considerable length during the long winter season between the fall and spring contests is undoubted, and the example, if carried through successfully, is bound to be followed by others. Such a run is, moreover, the first step toward the realization of a cold weather contest, which has been suggested in the columns of THE HORSELESS AGE repeatedly. We venture to say that the outcome of this event will be followed with the keenest interest in automobile circles generally.

Short Trials for the Coming Season.

In addition to the one "great" automobile event of the coming season, which is now occupying the attention of the N. A. A. M., and which, it appears, will probably be a run from New York to Chicago, there will undoubtedly again be held a number of minor contests, on the same lines as the 100 mile non-stop contests which have been held during the last two years. With the improvements in automobiles during this period such contests have become entirely inadequate to test the merits of the machines, and more difficult runs and severer conditions are to be recommended. The itineraries that have been selected for these contests so far have usually been over the best roads available for such purposes, and right here is where a change is indicated. Much has been said recently to the effect that a run in which speed is limited to 15 miles an hour is no test at all, and higher speeds have been recommended, but a more practical contest would be to hold a run over specimens of the poorest roads that are met in the ordinary use of automobiles. What the average buyer wants is a machine that will stand up at reasonable speeds on poor roads, rather than one which is capable of racing speeds on exceptionally good roads.

It might also be well to increase the length of a day's run from 100 to 140 or 150 miles, which could easily be made at legal speed if the start was made at 6 o'clock in the morning instead of at 9 o'clock. The start in the big races on the Continent takes place at 3 a. m., and it would seem that the start could be made in these runs at 6 o'clock without unduly inconveniencing anyone. In fact, there would be one direct advantage in starting thus early, in that the contestants would be obliged to spend the night before the contest near the starting point, and there would be less cause for late arrival at the start than with the present arrangement.

It may be objected that most vehicles are not provided with sufficient tank capacity to run 140 to 150 miles without replenishing their supplies, and that there would be no particular advantage in carrying supplies for more than a 100 mile run, as no such runs are ever made in regular touring without a stop. This is admitted, and it is suggested that at some intermediate point of the run at a control station the fuel and water supply of all machines be replenished. The run should, in fact, be held in two stages, giving the contestants an hour or so for lunch between the two stages.

It would certainly add to the interest in such contests to incorporate with them fuel consumption and hill climbing contests, as was done in the case of a number of the 100 mile contests last year. The results of these contests have been quite valuable guides for the purchasing public, and as there are constantly new machines n their appearance upon the merits of the public is in doubt, there is ne more such contests, though, as pointe they should be made more severe as

Air Cooling.

Air cooling of gasoline engine cyl was undoubtedly first introduced in E but the system has been developed h a much higher degree than abroad. years ago there were upon the I market a large number of light voit with air cooled motors, one of the prominent among them being the I ville two cylindered machine, but all types have passed out of existence. day we doubt whether there is a sing chine regularly manufactured in I with an air cooled motor. Of cour now and then hear of a high pc stripped racing machine with air motors, but it is obviously quite a di proposition to build an air cooled that will not overheat at racing spee machine to be run perhaps only short period on a track, than to buil a motor to run regularly under a variable conditions of ordinary traffi

In France air cooling of vehicle r may therefore be said to have pro failure. The reason for this is no far to seek. The makers that bui light air cooled voiturettes of three ago mostly took a simple tricycle and placed it on the vehicle, either body behind or under a bonnet in where the air circulation was nece much more feeble than on a tricycle with bonnets or body panels of perf sheet metal. The consequence wa the motor overheated, and when i course of time the public asked con for more powerful machines, the pr of air cooling seemed constantly to b more difficult, with the result that t cooled motor was abandoned. In th cauville machine referred to the two cal cylinders were placed one behi other in the body of the carriage; Mors four cylinder air cooled m the cylinders, which were provided the usual circumferential flanges, placed at an angle of 45 degrees wi horizontal and also with one cylind hind the other, and in a light single der Panhard machine the cylinde placed almost horizontally in the v body, although the cooling flange ran circumferentially. All these ar

ments are now known to be faulty, for a free circulation of the air between the flanges is the first essential of successful air cooling. The chief apparent reason why the French made a failure of the air cooled vehicle motor is therefore that they attempted to apply an engine specially worked out for use on a motor cycle to regular four wheeled vehicles, in which the air cooling problem presents far greater difficulties than on a cycle.

American builders of air cooled vehicles did not attempt to solve the problem in this manner, but started by studying the conditions imposed by vehicle design and then sought to adapt their motors to these conditions. The result is that there are at present upon the American market a number of medium weight air cooled machines in which, so far as can be learned, the principle of air cooling has been found thoroughly practical. One such machine is also manufactured in England.

This success with air cooling of vehicle motors in the United States after it had been practically abandoned in France is a good illustration of the folly of always looking for practical ideas to France.

Water in Gasoline.

There is constantly complaint from automobile users that the gasoline they buy contains water, and that in consequence they experience trouble with their engines. It may be well, therefore, to call attention here to means for effectively separating the water from the gasoline on its way to the carburetor. It is known that fine mesh wire gauze will not let water pass, while it allows the gasoline to flow through it freely. If then, the gasoline is caused to flow upward through a wire gauze sieve, the water will be separated from it and will collect at the bottom of the vessel in which the sieve is located, from which it may be drawn by means of a cock.

The idea of such a filter for separating the water from gasoline is not at all new, several devices of this kind being actually to be had on the market, but the frequent complaint about water mixed with gasoline seems to indicate that these devices are not as well known to users as they might be. It would, of course, be still better if all gasoline sold was entirely free from water, but we know of no means of insuring this desirable condition, and at present those who want to be free from troubles from this source will do well to fit a device of the kind mentioned in their gasoline piping.

Instruction of Operators.

By Albert L. Clough.

The success of each novice in the automobile field will be largely determined by the early instruction which he receives.

When one contemplates the splendid results attained by vehicles when entered in reliability contests by their manufacturers and operated by their trained men as compared with the ordinary results of the use of the same vehicles by the general public, one is impressed by the fact (which is new to no one) that there is everything in the operator.

Many letters published in The Horseless Age have related the experiences of chauffeurs who commenced their automobile careers without the benefit of any personal instruction at all. A little book of instructions or merely tags attached to the various controlling devices are frequently all the guidance that is furnished the novice.

Instruction is thus left almost entirely to experience, who we know to be a "good teacher." That "she keeps a dear school" a great many automobilists are ready to testify con amore. The attempts to learn the care and control of an automobile from shipping tags have made not a few "pessimists," and have fattened up the "for sale" column. Some of the instruction books are very plain and concise, but they cannot take the place of personal instruction in the handling of the machine by a really competent operator. The amount of disappointment and lasting prejudice which has been engendered against the automobile by lack of proper instruction in its use can hardly be overestimated.

Certain manufacturers have been wise enough to include instruction by a competent man as part of the agreement when a machine was sold; others have furnished an instructor for his expenses, which were by no means small when factory and customer were separated by half the continent, and some have charged not only the "expert's" expenses but his 60 cents per hour.

The instructors who were sent out by the manufacturers sometimes seem to be examples of "the blind leading the blind."

It is (or was) not uncommon to find that a knowledge of the Otto cycle did not form a part of the "expert's" mental equipment, and the setting of exhaust and igniter cams was accomplished by a cut and try method—"theoretical" knowledge being despised.

Most of these demonstrators are quite skillful if not dashing operators and have a certain skill in seeing how near they can come to things. A very skillful demonstrator is recalled to mind who had a remarkable penchant for climbing steps with his machine. He would run up so that the front wheels were touching the lowest step and then speed his engine to the limit and suddenly throw in the low speed clutch. There was usually enough vis viva in the balance wheel, which was a good one, to start the front wheels up the flight, when the performance was repeated with the rear wheels and the auto actually made to climb stairs. A prospective customer enraged the demonstrator by remarking that he was looking for an auto, not a passenger elevator. The feats of this kind which are performed by professional demonstrators are truly wonderful, but when they are witnessed one is tempted to remark, "If so, what of it?"

It seems to be the desire of many professional demonstrators and of almost all hired chauffeurs to make a smart, dashing appearance when driving—at the expense of the equipment. The novice gains a very harmful impression from this offhand and brutal manner of operating, and if he adopts it is generally sorry, as he does not have the factory behind him to make free repairs. It is common to see professional demonstrators and paid chauffeurs handle their motive power with a studied abandon and an eye on the "grand stand," which affords a good demonstration of how to tear an automobile asunder. This is not the kind of instruction that the prospective operator requires, as his machine may be expected to fall apart soon enough without special effort directed toward that end.

It is common to see one of these professionals speed his engine to the limit and instantaneously jerk in a clutch so that the rear wheels slip and strike fire, and before the vehicle has stopped its forward motion, snap in the reverse and manœuvre the carriage into position. It is a common practice of these gentlemen to make a stop by rushing up to their destination on the high speed and then apply all the brakes to their full capacity, often sliding the rear tires. Now, this is not the proper way to educate a new user in the handling of his machine, although it may be impressive to the bystanders. It would be better to set the example of careful and considerate manipulation of the levers, not only in the interests of safety but in that of the mechanism. A new user ought to learn to use only the amount of power necessary for the work in hand and should be instructed to speed his engine up only moderately, throw in the clutch in a reasonable way and to stop the vehicle by reducing the engine speed before reaching the stopping point, so that only a gentle application of a brake would be necessary to bring the vehicle to a rest at the desired point. This jerky and inconsiderate way of using any mechanism tends to its very rapid deterioration.

The first thing to teach the prospective user is how to use his carriage safely after he has been instructed in starting the motive power, and special stress should be laid upon the use of both brakes, and he should be told how, in event of their failure, he may bring his carriage to rest or at least within control, by the use of the slow speed clutch, and cutting off the ignition of the engine. The instructor ought to try his pupil with every emergency

which is likely to arise in the operation of a vehicle, and make sure before he leaves him that he will do the right thing instantly when each emergency arises.

The weakest point in the instruction which is generally given to the new operator is that no attention is likely to be called to the "tricks" to which each particular make of vehicle is subject. Every machine undoubtedly has them, but it is hardly to be expected that the manufacturer or his agents should call attention to them, although it would be for the good of the prospective user. The user is left to find these tricks out or to learn of them from some other user of the same make who has "been through the mill." The peculiar failings of each make are sure to make themselves known in automobile circles sooner or later, and it is easy for one versed in the subject to tell from the letters of users, in many cases, what make of machine theirs was upon reading what happened. The best advice that a new operator can get in many instances will come from an owner who has used the same make of machine for some time, and has found out all its little foibles. He has nothing to conceal. If one has a friend who is a thoroughgoing machinist, and he can be persuaded to go with the prospective user when the instruction is being furnished, he is likely to notice many things that an ordinary layman would not and gain many points which may be useful in the future.

The purchaser is likely to be somewhat carefully instructed as to the mode of starting the engine and the use of the levers, and to gain a few points as to lubrication, but the intended chauffeur who is really anxious to get to the bottom of things will find it for his interest to have explained to him how each and every bearing in the machine gets its lubrication and about how much oil it requires and of what quality. He should not be satisfied to know that a certain cup or tube supplies a certain portion of the machine, but should trace the course of the oil from start to finish and know exactly how it passes from the supply to the bearing surfaces themselves. He should become absolutely familiar with the ignition apparatus by questioning the instructor, and should be able to follow all the wiring, learn exactly how the switches operate, how the battery is connected up and how to make all the adjustments at the tremblers and at the contact device, as well as how to clean all the contacts and adjust the cams. It is essential that he should have demonstrated to him how to make all the adjustments on the clutches in the transmission device and the brake mechanism. He should have the carburetor dissected in his presence and learn exactly how the gasoline finds its way to the mixing chamber and how the amount of its flow is regulated, what parts need adjustment or cleaning and how to obtain the proper mixture. In studying the engine he should learn exactly how to take up wear in the connecting rods, how to remove the valves and grind them and how to set the exhaust cams, and he should find out in detail the water connections and the mechanism of the pump, and the means of driving it. If the tires of the carriage are of a kind hitherto unknown to him, he should have a lesson in the method of puncture repairing, and his instructor ought to inform him as to the proper uses of all the tools and wrenches in his tool box and what supplies he ought to take to meet the ordinary emergencies of the road. If a person enjoys the advantages of really thorough instruction, not only as to the safe, reasonable and considerate handling of his machine, but as to its construction and the peculiar derangements to which its type is known to be subject, he will, if he be ordinarily intelligent and use a due amount of care, be fairly started upon a successful career as a chauffeur which will be not only a credit to himself but to the manufacturer of the machine which he operates.

The Crystal Palace Show—Gasoline Exhibits.

RANSOMES, SIMS & JEFFRIES, LTD.

Although having shown motor lawn mowers and motor rollers previously, Messrs. Ransomes exhibit several new motors of larger power and with refinements in the way of ease of handling, etc. The largest machine, with 6 horse power, can be used either as a mower or roller; it is fitted with magneto ignition, water cooling, starting clutch and useful sliding arrangement for depositing mown grass on either side of the machine when desired.

The motor is a Simms with float feed carburetor, and the engine propels the machine and also drives the cutters, making a self contained and self driving machine.

W. MILLS & CO.

This firm, who are known for their aluminum and aluminum mixture castings, of which they have made a specialty for the motor trade, have on their stand a number of excellent samples of all descriptions of gear boxes, crank chambers, steering wheels and numberless small articles conveniently made out of this metal, all showing very clean molding and great attention to the work.

HEDLEY S. HUNT & CO.

A large collection of compound tire inflaters is shown here, with and without pressure gauges, and in various sizes. As is known, these pumps work on the compound principle of two stage compression, having one large and one small cylinder, whose respective plungers are operated by the same handle, giving, it is claimed, very easy inflation.

RUCKER PNEUMATIC TIRES.

To overcome the possibility of the inner tube bursting should a cover detach itself from the rim or should a cover be gashed, the Rucker inner tube is ma a very ingenious principle by being externally with a sort of compound t that is to say, a thread composed o windings, one much weaker than the and so arranged that the weaker breaks on excess pressure, but the st er thread supports the tube under al ditions, so that it will not burst. nary tubes can be treated with this ing. A new non-puncturing strip i shown made of wood and rubber in method and fits inside the cover.

NORTH BRITISH RUBBER COMPANY

This firm have taken up the ma ture of the French Michelin tire, and samples of the same on their stand. are made according to the French p

RUBBERY & CO.

This firm, who have supplied c steel frames for a number of years now put down plant for making fra a pressed steel variety, as seen most recent pattern cars in the exhi

EVART HALL, LIMITED.

Although at the time of our vi eight cylinder 40 horse power "C. car had not arrived, it was mome expected and was to be running grounds. As is well known, the gear in this car is suppressed and power given to the engine.

THE DUNLOP PNEUMATIC TIRE COMP

The chief item of interest here new Dunlop non-slipping tread, wl attached to the tire in either of two viz., by vulcanizing on or by att with two endless wire hoops. In th case the tire is deflated, the non-skid tached and the tire then blown up, s ing the tread. The tread itself is a band of hard rubber with semi- grooves cut across it transversely a ings at about $1\frac{1}{4}$ inches. It is to be very effective, even on th treacherous grease.

BRAMPTON BROTHERS.

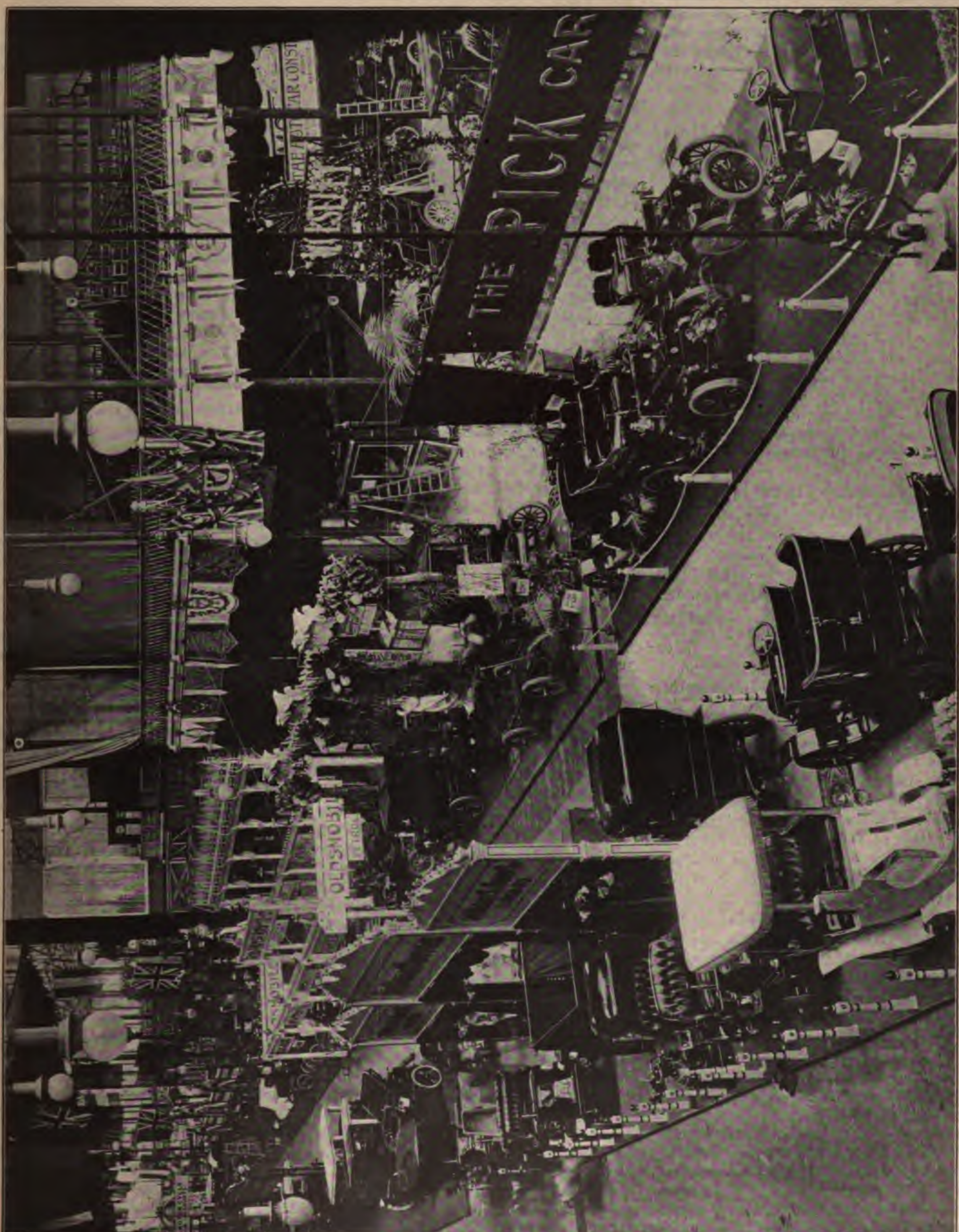
This firm, who have a worldwid tation for their chains, have still extended their range of sizes and p to suit anything from the lightest to the heaviest lorry.

CAPTAIN H. H. P. DEASY.

Although a French car and having been noted, the Rochet & Sc car differs in several respects fr regular type, and has among other the clutch spring arranged just in frame, where it is easily getatable. an ingenious timing device for the moment of ignition of the rota neto used, this being done in all inders synchronously by a small within easy reach of the rider just the dashboard.

SAVAGE BROTHERS.

To avoid the unsightly and unn cal studs usually projecting from side of the spokes of the back wl the purpose of carrying the chai and brake drum, a new form o



GENERAL VIEW OF THE CRYSTAL PALACE AUTOMOBILE SHOW, LONDON, ENGLAND, FROM THE NORTH NAVE.

which extends out in a very stout shape carries the brake drum, this being bolted directly onto the face of the projections. Were there not ample material, this might appear like a weak construction, but in fact, in the form shown it is very strong indeed.

SWIFT.

The Swift car, which is made up of steel tube frame and cycle built wheels, with a single cylinder engine, has been altered in several respects lately. This is one of the cars which has no differential but drives by ratchets. To give the possibility of reverse, a device is employed which brings into play reverse ratchets. The absence of the differential reduces the cost somewhat, while the whole car is very simply and thoroughly made. The forward and reverse speeds are arranged in a case on the back axle, taking the place of the usual differential, while the frame itself is attached rigidly to the wheel axles, the body itself only being spring mounted. The car is well provided with brakes and stands out as an excellent specimen of vehicles turned out by a bicycle firm.

ALBION MOTOR CAR COMPANY.

The Albion car is one differing in some respects from the usual type. It has a two cylinder engine about the centre of the car, the cylinders being horizontal and opposed to one another with cranks at opposite centres. The ignition is by magneto, the magnets being attached to the flywheel and revolving around a fixed armature. The ignition is not variable; the usual positively driven water pump is used. One foot lever is used for the clutch and brake—that is, it first releases the clutch and then applies the brake; the second brake is on the tire of the back wheel. The gear box is under the engine and in one with it; from it the drive is transmitted to the differential, arranged in the centre of and above a divided back axle. There is a pull up starting arrangement from the seat. The body is of the usual tonneau type.

UNITED MOTOR INDUSTRIES.

Although representing chiefly foreign manufactures, one cannot pass this stand without noticing a great variety of accessories exhibited, the same appealing to all interested either in the manufacture or handling of cars.

PANHARD AND LEVASSOR.

Although coming under the heading of French cars which have been described, a word may be said respecting the Panhard chassis, which is exhibited and is fitted with the new Krebs carburetor, which gives, as is known, additional supply of air automatically at the higher speeds of the engine. This carburetor can be fitted to any of the Panhard engines. The engine under notice is ignited by a governed dynamo, driven from the flywheel by friction and the engine itself is carried on the under frame type of support.

DECAUVILLE.

Although another French production, mention may be made of a very useful feature of these cars, viz., the very easy detachability of the back wheel from the live axle, and the taking of all strain caused by the weight of the car from that axle. The wheel is carried on an extension of the tubular axle and is detached in a simple manner without disturbing any other part. The cars generally are built somewhat higher than the prevailing type; they have tubular frames and exhibit the usual high class workmanship.

H. WATERSON.

This well known factor has a collection of chiefly foreign accessories, but among British made specialties will be found ignition coils having several points of merit over usual construction. A great variety of parts for the trade are stocked here.

THE COLLIER TIRE.

The construction of the Collier tire is so well known that it is not necessary to say much more than that detailed improvements only have been effected. Several tires are shown fitted with the Parsons non-skidder, which is a device made up of chains across the tread connecting two hoops, one on either side of the wheel, the whole arrangement being free to travel or creep round the tire in use. This is a most effective non-skidder, applicable to any make or size of tire without alteration.

DENNIS BROTHERS, LIMITED.

This is one of the very few live axle cars which are fitted with that very necessary but so often omitted feature, viz., a radius arm rigidly attached to the differential case of the live axle, and held as to its forward end by some part of the frame. The fact that the driving pinion in revolving the large bevel has a tendency to revolve the live axle case around its centre is often lost sight of, and the strain in that case has to be taken by the springs. In the Dennis car not only is a radius arm provided, but it is held by springs allowing just a slight up and down motion. The Dennis car is now fitted with a spring drive. Two or four cylinder Aster engines are used, according to the type of car, the radiator being of the enclosed gilled tube type. In other respects the car represents ordinary practice.

THE REX MOTOR MANUFACTURING CO., LTD.

There are one or two alterations in the Rex cars of recent pattern, such as the half compression lever, which is now operated from the steering column, and a very neat foot accelerator, this latter being capable of being locked quickly and simply in any position. The water space around the engine and valves has been increased, while the body and seating accommodation have been made more extensive. In the case of the motor bicycle not much alteration has been made since last exhibited, but the engine is peculiar in having no separate exhaust box, connected up to a pipe as usual, but instead of this an exhaust chamber is cast in one with the cylinder, and is fitted with several baffle plates, claimed to create practically no back pressure while silencing thoroughly.

WILSON-PILCHER.

This car, which is remarkable for its extreme silence and absence of vibration, has only one or two alterations, viz., the lever speed changing, longer wheel base, equal sized wheels, and retains its original features in piston rings and commutator. The engine has four cylinders opposed, two on each side of the crank shaft.

DE DION BOUTON.

Although another French car, there are one or two points of novelty about the latest pattern, viz., the speed gear and case being combined with the differential box on the rear axle—in fact, all in one casting—and the circulation pump, instead of being friction driven is now operated by means of a flexible shaft in the form of a spring. This, of course, gives a positive yet flexible drive.

NAPIER.

The Napier practice is well represented at this stand in several of these cars, the chief points of which are connected with important details, and bear evidence of having been carefully thought out where improvement was possible. The dashboard is well stiffened by cast brackets in front of same, which brackets carry bearings over the clutch and brake lever shaft, instead of the usual practice of fixing such bearings on to the dashboard itself. This makes a very neat and rigid whole. The circulating pump is driven off the flywheel, but being in the same position as hitherto, where it is liable to be damaged by any obstacle the car may pass over; it is now thoroughly protected by a stout case. The engine itself has automatic inlet valves, and is noticeable for the large proportions given to all its pipe connections. The band brakes on the rear wheels have been redesigned, and the commutator on dashboard is of the latest pattern designed by this firm, having the plate arranged so that the terminals to which the wires are connected do not move. The remainder of the constructional features are fairly well known.

ARIEL.

The stout tubular frame is retained on the Ariel car, together with the higher speed type of engine designed a little time back. A device as used by quite a number of firms is the additional air valve between the carburetor and engine. One lever operates both clutch and brake, and special attention has been paid to the adjustability of all rods and joints of the car, so that no rattle can possibly take place. The radiator is composed of flat tubes, while the cars are carried on either ball or roller bearings, according to their size. Several exposed chassis enable visitors to study all these details very well indeed.

MOTOR MANUFACTURING COMPANY.

The productions of the Motor Manufacturing Company have had one or two improvements effected where possible, al-

though broadly speaking the designs have not been much altered. The inlet valve, for instance, on the small cars is controllable as to opening, thus varying the power, while a number of the smaller motions are now worked by Bowden wires instead of the usual rods and levers. The Motor Manufacturing Company car is one of those which has its gears operated by sliding keys on the shaft, the whole of the gears being continually in mesh. The tubular frame is retained in the smaller models, while the larger car is most efficiently protected from dust and dirt, as to its gears and underneath portions, by an extensive aluminum sheet protecting the whole of its parts. In the larger car the engine is fitted for both tube and electric ignition, being governed on the throttle. The secondary frame is suppressed, the crank chamber and gear box being bolted direct to the main frame.

BROOKE CAR.

The Brooke car has always been distinguished from others by several essential features always found in these vehicles. For instance, the drive is by chains only, and the Estcourt cooler and Estcourt valves are used. The Estcourt cooler is arranged in the place of the ordinary dashboard, and provides sufficient cooling with natural circulation, while the Estcourt valve is one having two springs, one weak and one strong. On the valve opening the movement is continued, until the valve stem washer strikes the stronger spring, when it is quickly returned to its seat. The latest pattern of Brooke engine, which is always a three cylinder one, has mechanically operated inlet valves. A governor differing from the usual bob weight type is used and acts on the principle of suction—that is to say, on the engine exceeding a predetermined speed, the suction from its pistons being greater, draws a plunger beyond its travel, so to speak, thus closing a port. The firm have on the stocks a new car on Mercedes lines, blue prints of which are shown.

VELOX CARS.

The new Velox car has been so recently fully described in the technical journals that it is almost superfluous to recapitulate its many points, but mention may be made of the spring drive which is introduced at the back of the gear box, which spring drive is being fitted by several makers, the use of a type of Horn plate to retain the back axle as to its vertical movement, the springs, of course, allowing full play. The radiator is fan cooled in front, while what is often called the apron part of a car, that is, the part depending from the front of the frame, is in this case composed of a water tank with an opening through the centre for the starting handle. The frame is a tubular one arranged for easy removal of the gear box.

MAUDSLAY.

There have been several recent improvements in the Maudslay car, all chiefly remarkable for their practical nature. As will be remembered, the Maudslay engine is a three cylinder vertical one arranged in front, as usual, but it has its valve gear arranged upon the top of the cylinders. Whereas previously the inlet valve, although on the top of the cylinder, was atmospherically opened, it is now arranged to be mechanically operated directly from the same lay shaft above mentioned. This shaft, with its case running right across the top of all these valves, is arranged so that it can be folded back and any valve removed in an instant. To effect this there is a universal joint in the shaft driving it and a detachable connection to the commutator arranged high up on the dashboard coincident with the end of this shaft. The operation of withdrawing the piston is simply done by removing one small door on the side of the crank chamber. The lubrication of both the engine and the gear box are positive, by means of pumps, and the circulation of oil is most ingeniously carried out. The shifting of the gear wheels for the speeds is arranged by means of a cam plate in the gear box. The distinguishing feature of this car is the ample accommodation given in the carriage portions, and whereas the wheels were formerly of unequal size, they are now made equal.

MARSHALL.

The new Marshall chainless car is quite full of original points. The back axle is connected to the back springs, not in the centre of the latter, but about two-thirds of the way along from the front, giving, so to speak, a long arm in front and a short one behind. The effect of this is to take up the twisting strain due to the torsion of the driving pinion in a flexible manner, what really happens being that the back axle twists a small amount, governed by the long flexible arm of the said springs. All the brakes are arranged on drums on the back wheels, viz., two internal and two external, thus relieving the gear of all braking strain; just behind the flywheel is fitted a check plate, and on releasing the clutch an arm comes into contact with this, so checking the speed of the gear wheels, and under certain conditions making it easier to change speed. The engine has the inlet and exhaust valves arranged on the top of the cylinders, and all these valves are remarkable for their easy detachability, each valve case with valve and spring complete being withdrawn. The circulating pump is fitted with a filter and is easily cleaned out. The brakes are metal to metal and the whole car is very solidly made.

JAMES & BROWNE.

This is another of the cars distinguishable for special design, being quite apart from the usual type. The engine is a two cylinder horizontal one with the cylinders opening backward, and one case encloses the cranks and change speed gear in one piece. The speeds are changed by means of an edge cam plate. The countershaft brake is metal to metal, applied in a very powerful manner, and of course is not affected by oil. The rear wheel brakes are well known as of the toggle operated variety, expanding inside the drum fixed to the rear wheel. By an ingenious improvement the act of tightening the driving chain does not now necessitate any readjustment of the brake operating gear. The carburetor is fitted with a weight externally instead of internally, which has several advantages in easy testing of the float, providing a dust excluding cap, and giving a hold for grinding in the valve. The inlet valves are instantly removable by lifting up the supply pipe, which works upon a hinge.

CLIPPER PNEUMATIC TIRE.

Quite a number of new non-slippers will be found in the exhibition, and one of these is the device known as the Clipper non-slipping cover. It consists in providing the tread of the cover with disks sunk into the same at intervals of every 3 inches or so, and into a threaded hole in the centre of each disk there screws the stem of a circular tread of metal, having a pyramid surface; that is, the tread is made up of a number of circles, each circle being composed of a number of points. When these wear down new disks can be screwed in.

HUMBER.

The Humber light car has a few points which might be enumerated. The engine is fitted with mechanical inlet valves on the opposite side to the exhaust and the valves are particularly easy to get at. The commutator is carried higher up on the dashboard than usual and is very easily visible for this reason. There is a transverse front spring, the front axle being retained in position by radius rods from the centre of the frame. The back springs are provided with a type of horn plate, retaining the axle in position. The steering wheel is of the well known open type, having only one spoke to its wheel, so to speak; the dashboard is particularly strongly supported by means of a stiff webbed aluminum casting which makes it practically part of the frame. The engine is throttle governed. The body of this car is remarkable for the number of drawers and cupboards, provided and arranged in such a way that they are easily got at without disturbing the occupants of the seats. Those in the tonneau seats, for instance, draw out at the back of the car. The Humber bicycle is a chain driven one, with a spring clutch, and beyond the fitting of a combined timing and exhaust lifting lever has not been altered lately.

HOZIER.

These cars are found improved in one or two particulars worth noting. The chief alteration is a method of changing speed, which, by giving the speed lever three separate motions, one at right angles to the other two, provides a dead stop for the lever at each speed, so that there is no difficulty, as is sometimes found in getting the speed lever in the

correct notch. In the Hozier the lever has only to be pushed to its limit, and even then if the wheels are not in position to mesh at the moment, a spring comes into action and, when the wheels are ready to mesh, brings them into gear. Of course, any speed can be obtained without passing through the other speeds. The clutch is made by inserting in the female portion a ring which, being made in three parts, provides a cone surface which is adjustable for the leather lined portion of the clutch to engage with. The Clement engine is now fitted to these cars, which latter have live axles carried on rollers.

THORNYCROFT.

In addition to a number of the well known Thornycroft steam lorries this engineering concern shows for the first time their new gasoline light car, and this is worthy of comment in one or two respects. The appearance and design of the whole vehicle bear undoubted evidence of the same skill having been brought to bear upon them, as in the case of the above mentioned steam lorries. The car is a live axle one. The frame is of pressed steel, and the engine is a four cylinder one with the usual mechanical exhaust valves and automatic inlet valves, arranged for instant inspection, this being possible by lifting up on its hinge the supply pipe. The speed gear is of the type giving a direct drive on the top speed, on which speed the lay shaft is stationary. Three speeds forward and the reverse are available, all operated by one lever. The usual rear wheel brakes are provided, but are of V section, and one V section brake is provided on the propeller shaft arranged close to the differential, thus obviating the braking effect going through the universal joints. The pump is arranged at the lowest point of the circulation, while the governor is enclosed and acts upon a throttle so arranged that on cutting out a fresh air supply is automatically opened, which cools the engine, and the latter never draws against a vacuum, so to speak. The ignition is by governed dynamo, charging cells which are used in conjunction with the ordinary high tension coil. The now common honeycomb radiator is carried in the usual position in front. The dashboard and steering column are well supported.

THE PICK MOTOR COMPANY, LIMITED.

The Pick, a car at a reasonable price, but containing features of its own, is shown both as a belt driver and driving with chain. In the belt drive no clutch, of course, is used, while with the chain a clutch is used, and this together with the first chain drive. The Panhard gear is set across the car and the rear chain drive is after the Wolseley style, except that there is a live axle with a single chain between the wheels. The engine is a horizontal one, in front, with two opposed cylinders, the cam gear being arranged above it, and carrying the circulating pump and commutator. The new band brake is shown, which has a departure from ordinary practice, in having a double cam which, on being rotated, draws the two ends of the brake band together; this is very cheap to make, takes the weight of the band when off, and will retain itself in many positions by friction on the cam face. The radiator is arranged on the front and at the two sides of the bonnet.

ELECTRO-MOBILE.

This company's new electric car is shown in chassis form and is found to contain one or two departures. Instead of the two motors usually found, each driving one back wheel, there is in this car but one motor of the series wound type, which drives a differential on a live axle by means of a two stage reduction gear, this latter being provided with double helical teeth. This gear is all closed in and is very efficient. The back wheels are provided with expanding brakes fitted inside drums, while the back wheels on most of the cars are provided with the Gallus non-slipping tread. This French non-skidding device, it will be remembered, consists of steel strips, fixed across the tread of the tire and incorporated with its cover. Two electrical brakes are fitted to the car, together with a very ingenious form of automatic cutout, which, being spring loaded, gives a very quick break. A battery of forty-two cells is carried, while the steering is of the usual pinion and sector type.

ANGLO-AMERICAN MOTOR CAR COMPANY.

At this stand there is always an appreciative crowd greatly interested in the various types of American vehicles, including steamers, the Oldsmobile and the Baker electric torpedo. All these productions are well known to American readers.

LOCOMOBILE COMPANY.

Although showing a very large number of their well known steamers with illustrative pattern, the Locomobile Company have only vehicles which are well known to American readers, but a word may be said of the excellent manner in which they are staged, and note taken that one of the cars is shown in operation.

SIMMS MANUFACTURING COMPANY.

Trade requirements form the leading line of this company, who show quite a variety of engines, not only for motor vehicles, but also for launches and domestic purposes. The Simms-Bosch magneto ignition is so well known that description is not necessary, but all conceivable sizes for any type of engine are shown and can be obtained. The bicycle engine is now fitted with mechanical inlet valves, and is variably timed by the magneto. A new cooler is made up of two end boxes connected by a large number of straight horizontal tubes of small bore, about ten or twelve of these tubes having threaded over them the radiating gills, making them into one member, so to speak. The whole radiator is made up of five or six such horizontal combinations. The speed gear is operated by a cam plate, as is the case with several cars in the
Show, and is very useful where tw
arate gear striking forks have to be
ated, as in this case. A through dr
the top speed is provided. The live rea
is provided with tension rods to prev
twisting about its centre under drive.
usual brakes are provided, of the m
metal type.

LANGDON DAVIES.

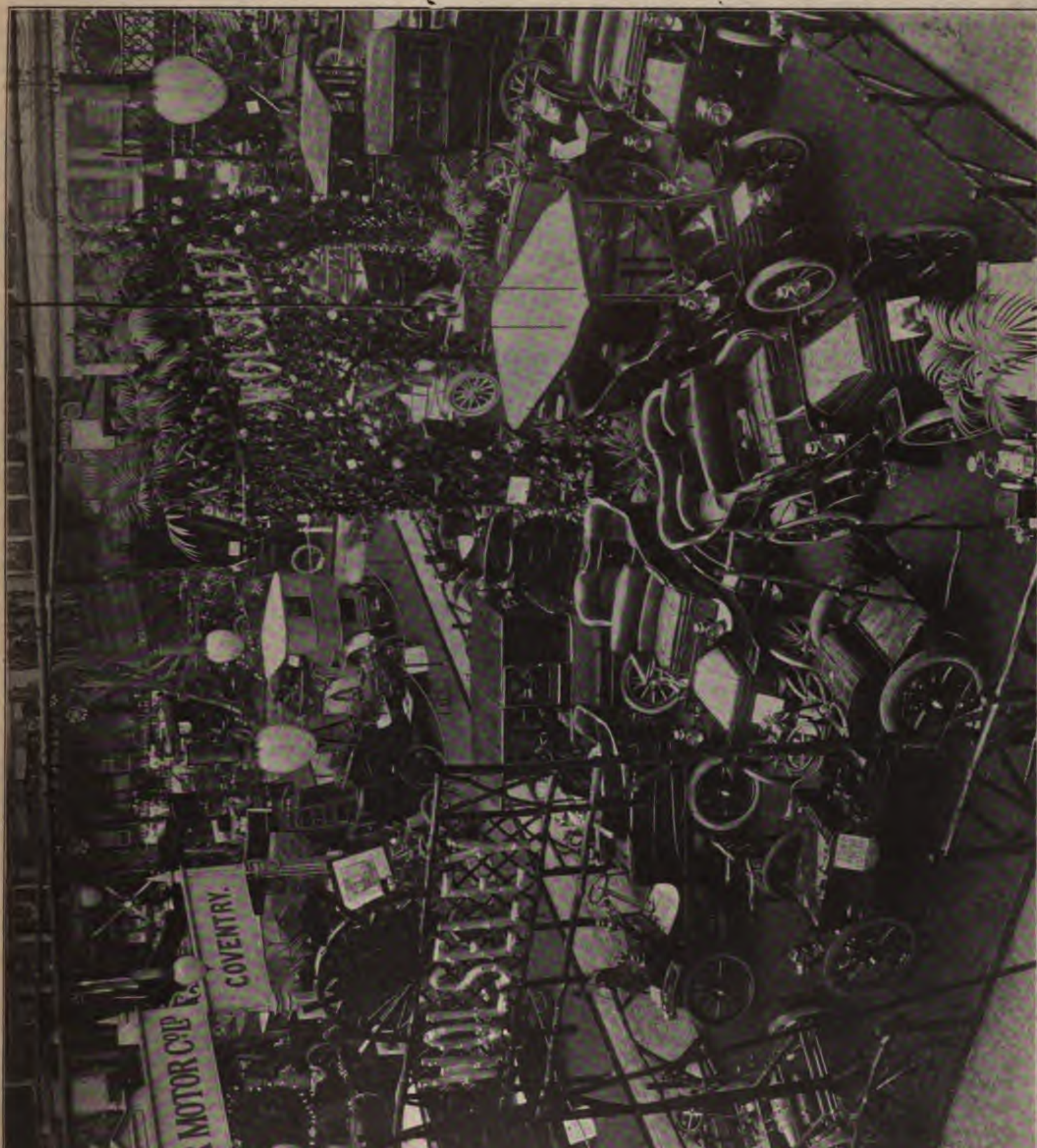
This is a car differing largely fro
usual practice, its chief feature bein
two frames are provided, both sprin
ported, the upper one carrying the
and the lower one the whole of the
speed change gear, etc., complet
though this lower frame brings th
rather near the road in the model
it has the advantage of giving facil
lining up the whole of the parts in
relative positions and is very littl
torted on uneven roads. The engin
vertical one in front, driving the
speed gear behind it at right angles
which the power is taken to a liv
axle by two very strong chains arran
parallel, so to speak, so that in the
of one breaking, the journey's end
reached by the other. The gear is c
on the sliding feather principle.
genious trip is arranged for holdi
clutch, which is spring supported
usual manner, in any desired positio
of the brakes on this car consists of
disk with which is brought into co
double lever, and each side of this
coming down over the edge of th
disk, which has a taper section,
strong wedging action is set up.

G. T. RICHES.

Among a very large collection of
and accessories a high tension igni
shown using the ordinary spark pl
coil, but replacing the battery with
namo. One of the many external
gap forms of ignition attachment
shown, but this external gap is n
tected in any way from the possib
the explosive vapors from a carbur
otherwise coming in contact with it
gap is, however, adjustable, and this
essary to get the best results. It is
that an external gap in the high tensi
cuit has the effect of preventing a
plug from ceasing to fire when t
present an excess of lubricant.

LONDON MOTOR GARAGE.

This firm, who are representativ
several types of cars, show the La
among them, and a chassis of this i
ing car, exhibited almost for the firs
enables one to get a very clear unde
ing of this vehicle which differs so
from the usual practice. The engi
its cylinders arranged opposite one
and is provided with the Lanchester
balancing mechanism, consisting
crank shafts, one above the other, a
connection rods from each piston,
to each crank at either end. The e
this is that the angular thrust is con
obviated. The engine is air cooled b
ating gills and fan, and is magneto



STANDS OF DAIMLER, WOLSELEY AND OTHERS AT THE CRYSTAL PALACE AUTOMOBILE SHOW.

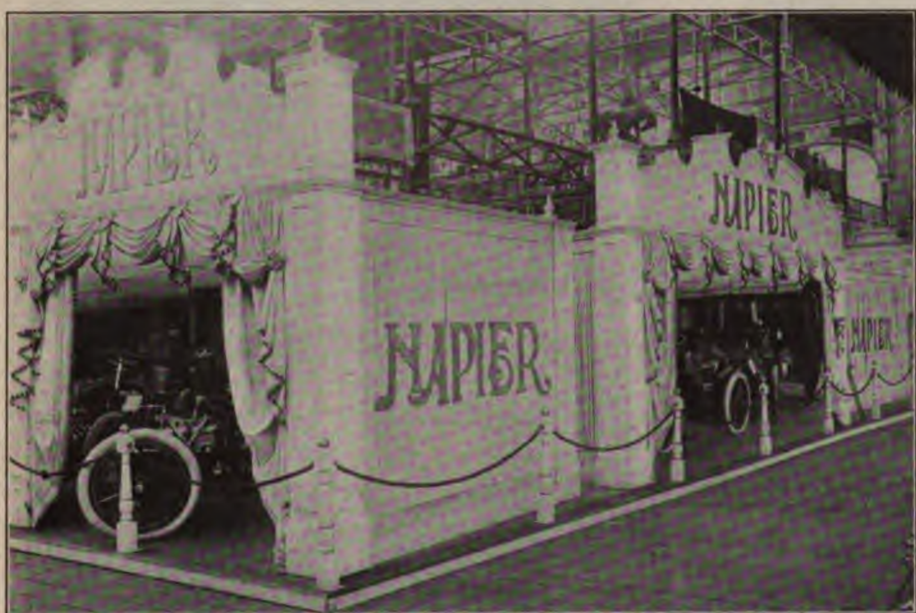
the current generating device being arranged in the flywheel. The speed gear is of the epicylic order, and from the gear box the drive is transmitted by a worm, having a number of starts. The spring system of the Lanchester is worthy of careful note, and is of the type having one of the springs fixed to the body, while the free end carries the axle. This is the case both in front and rear. There are also compensating buffers. This car is always distinguishable by its dashboard, which can be folded back toward the driver, thus giving excellent protection to the occupants of the front seat.

CENTURY ENGINEERING COMPANY.

This company, the manufacturers of three wheel vehicles known as the Century tandem, naturally show several of these, but also a large collection of the ordinary four wheeled vehicle. In the three wheel tandem one or two alterations have been effected lately, viz., the Longuemare carburetor is now used in place of the triple wick variety, formerly in favor; also the radiator known as the Begbie Audin, which consists of a large number of very small circular tubes, is adopted. A number of these tubes are threaded close together through the same radiating fins, exposing very much surface. The 5 horse power Aster engine is used, and otherwise these three wheelers are much the same. The four wheel cars themselves are on usual lines, but are fitted with one interesting and practical improvement, viz., the provision of a small incandescent lamp fitted to the speed change lever just above the quadrant and so arranged that on changing the speed the lever, when brought back out of its notch, completes the electrical circuit, thus showing a light on the quadrant notches, and this light is not extinguished until the lever is again in one of the notches. For driving in the dark this is a very useful fitting.

BRUSH.

Although most of the motors and mechanism shown here bear strong resemblance to usual practice and also evidence of most careful workmanship, one or two points may be mentioned. It is often found on four cylinder cars that the device for drawing heated air for the carburetor is applied to one only of the exhaust pipes, and if this exhaust pipe happens to come from the cylinder which cuts out most or which might conceivably be "missing," then the result is that the air is not heated as it should be, especially in cold weather. In the Brush car we find that the air heating box is applied to a pipe common to all four of the exhaust pipes, obviating the above defect. Most substantial gear wheels, formed of metal and fibre, are used on this engine, and the pump is positively driven. A honeycomb radiator and fan are used, but the secondary frame carrying the engine and gear is retained.



NAPIER STAND AT THE CRYSTAL PALACE AUTOMOBILE SHOW.

DURYEA COMPANY.

Duryea cars need no introduction to American readers, but included in the exhibit is a model of the Duryea combined exhaust valve and make and break inside the cylinder. With 8 volts pressure a very effective spark is produced.

STAR.

The mechanical portion of the Star car has not been much altered, except that the now common increase in the number of cylinders is most fully carried out. The 7 horse power is the only one with two cylinders, all above this having four cylinders. The company's Roi de Belge type of body is a most gracefully outlined construction and affords any amount of room for the passengers. The Star Company have entered one of their cars positively for the Gordon Bennett race, despite all rumors to the contrary.

NEW ORLEANS MOTOR COMPANY, LIMITED.

These well known light cars have several improvements lately added. A feature is that any one of the four primary circuits can be cut out by its corresponding switch, so that the firing can be tested while running the engine. The dashboard is strongly stayed by two ties running to a point over the front axle. All four cylinders are separate castings. The Sthenos carburetor has been adopted, and the engine is governed on the throttle. The crank chamber has two twisted copper pipes passing upward, providing relief to the crank chamber without passing oil. These interesting light cars are being followed by a larger and heavier type.

EAGLE ENGINEERING COMPANY.

The Eagle light car has a tubular frame and is designed on the now usual lines, but the Eagle tandem attracts some attention, being a three wheeler. This tandem is on the lines of the Century, but is fitted with a steering column in front of the driver, controlled by a hand wheel having one spoke only, enabling the control levers to be got at through the wheel.

WESTERN MOTOR SYNDICATE.

The chief item here is the Chenard & Walker light car, the chief features of which are an ignition for a two cylinder engine which gives a spark at both plugs, at every ignition moment, one spark taking place in compresed gas and the other, of course, in burnt gas. This arrangement has the curious effect of giving what so many makers are arriving at, viz., a second gap in the circuit outside the plug that is firing. The engine has a graduating inlet valve cam, not altering the lift but altering the period of opening. The clutch on being withdrawn far enough comes in contact with a braking surface. The power is delivered to a shaft parallel with and above the rear axle, and driving the wheels by means of pinions inside internally cut toothed wheels.

CITY AND SUBURBAN COMPANY.

The exhibit comprises some twelve or fourteen electric carriages. There is also a composite gasoline electric car in which the engine generates current either charging the battery or both charging and supplying the motor. The drive is by electric motor, and the battery is of course smaller than usual. Some very good running has been done with this car. Her Majesty the Queen's electric victoria is shown, together with a car specially designed for the Sultan of Morocco. Electric cars having a bonnet in front similar to gasoline vehicles are found here, and half the battery is carried under this bonnet.

H. E. HALL & CO.

The chief exhibit among a number of cars here is the Kitto light car. This construction is due to the efforts of Mr. Kitto, who has recently been to the States and had a car designed to suit the English market. Its points are that all brakes are

ipplied, there being no hand lever, l. The commutator is brought out side of the engine just inside the The steering wheel is made so may tilt up to a vertical position required, thus giving ample room occupants of the front seat to get out, while the back seat folds for- nd so forms the sloping back of the sually found behind the seats in a ited car.

DAIMLER.

ller practice, which has been so ghly will tried, is retained broadly, new cars have several alterations, ng them more efficient and more ient in the handling of the parts. ar box, for instance, may have its l bottom removed without disturb- gear in any way. The clutch spring placed under the footboard close to t pedals in a most accessible posi- r adjustment. Three point suspen- adopted for the gear box, while the Daimler pressure feed is retained. omatic air valve is introduced in accepted fashion, between the car- and the engine. A magnificent new His Majesty King Edward VII is .

WOLSELEY.

ry large number of Wolseley cars ibited, but the design has not been l essentially. Some of the details iodifications, of course, such as the pressed steel frames and the length- if wheel base, the design of bodies, mong the cars is found the identi- horse power three cylinder racing iich took part in the Continental ition last year. As is known, the ey has a horizontal engine in all combined with chain drive and a d gear arranged across the frame. ne of the most notable exceptions general rule of vertical engines.

WELLER BROTHERS.

exhibit is causing considerable at- on account of the novelty and util- most of the devices shown. A car te shows the engine and gear to be on a frame which is suspended at oints. The engine has access lids each crank on the side of the crank r and the big ends are constructed the brasses are adjusted or with- from the side of the connecting rod l. The arrangement is particularly id strongly worked out. The inlet are mechanically operated and are opened by springs and closed by ods, which take the springs out of so to speak. All four fulcra of the so closing the inner valves can be or lowered in unison, so lengthen- shortening the period and lift of t valve opening. An ingenious uni- joint is used which possesses no surfaces or wearing points: Two e steel plates cut in the form of a nd held between flat U shaped pieces on the end of each shaft to be coupled. Two outside arms of the cross shaped plate are attached to the U piece to one shaft and the other two arms to the other U piece. This not only provides for a universal joint angularly within certain limits, but also allows of a certain amount of end play. A bicycle engine shown has some points, among which is the Gudgeon pin of the piston. This drops down two grooves inside the piston and is held at the bottom of them by two eye bolts, passing through the piston solid end and held by nuts. This prevents the possibility of the Gudgeon pin removing sideways and scoring the cylinder, as there is no hole through the sides of the piston.

BOWDEN'S PATENT SYNDICATE.

The well known Bowden wire is shown applied to endless conditions of service. This device as is known has a central wire passing through a coil outer wire, and transmits motion round corners, or in any direction along loose wires. Motor cycle and motor car manufacturers use it very largely for operating the various light mechanisms they wish to control.

BAT MOTOR BICYCLE.

The Bat motor bicycle is one of the very few made in the form of a spring frame. The vertical tube carrying the saddle is suspended on four coil springs, free to move up and down. There are no pedals fitted to this bicycle, which has a very powerful engine.

BICHRONE MOTOR.

This is a two stroke engine, but has valves, and operates by means of an additional pump chamber, which draws in and partly compresses the charge, then transferring it to the combustion chamber, where compression is completed. The pump chamber is arranged at such an angle with the main cylinder as to give injection of the charge at the correct moment. A very high speed is claimed for this engine, both of the two stroke variety, and for the power claimed. The dimensions are small, owing to the extra number of explosions.

The Chicago Automobile Show.

The Automobile Show held under the joint auspices of the Chicago Automobile Club and the National Association of Automobile Manufacturers at the Coliseum Building, on Wabash avenue, Chicago, was opened at 2 p. m. on Saturday, February 14. The Coliseum is said to have a floor space of 35,000 square feet available for exhibition purposes, and the management experienced less trouble in accommodating the demands for space than was the case with the recent New York show. The number of exhibitors of complete machines is slightly larger than at New York, almost all the exhibitors at the New York show having taken space at Chicago, and in addition quite a number of manufacturers located in the Middle West, who confine themselves mostly to the runabout type of machine.

By far the greater part of the exhibits of complete vehicles is of the gasoline class, a proportion of 70 to 75 per cent. of the whole, while the rest of the exhibits are practically evenly divided between steam and electric cars. The spaces allotted to manufacturers of vehicles are those in the centre of the main hall, while the exhibits of parts are arranged along the walls. The lower floor of the annex is also devoted to exhibition purposes and to speed demonstrations of electric vehicles on a special testing rig, while the second floor of the annex serves as headquarters for the Chicago Automobile Club and the National Association of Automobile Manufacturers. The gallery of the main hall is entirely free, except that a band gives concerts there every afternoon and evening.

The vehicles exhibited comprise every class and style, from the lightest and cheapest runabout to the most ponderous and expensive imported touring car. However, foreign machines are comparatively little in evidence, and the lighter class of vehicle is proportionally better represented than at the recent New Yo k Show. A fine view of the main hall, which comprises nea-ly all the exhibits, may be had from the gallery.

The evening before the Show the Chicago Automobile Club held a meeting at its temporary headquarters at the Coliseum, to which were invited a number of members of the trade and press, the meeting being presided over by F. X. Mudd. Those who attended this meeting were given a chance to take a preliminary view of the exhibition before the opening. An address of welcome to the visitors was delivered by President Charles W. Gray, of the Chicago Automobile Club.

The Show itself opened at 2 o'clock on Saturday afternoon, and the attendance the first day was fair, it being estimated that by 4 o'clock there were 3,000 visitors in the building. The attendance the first day comprised not only members of the trade and a general public from in and out of the city, but the papers stated that a number of leading Chicago society women had been present and had shown great interest in the machines on view.

The Chicago Automobile Club has appointed an entertainment committee comprising twenty-five members, which will look after the visitors and exhibitors during the Show.

The Show at Chicago is accompanied by almost just as many meetings and entertainments of one sort or another as was the New York Show. On Monday evening the judiciary committee of the Chicago City Council was to be given a trip around the city in automobiles, and later on these same city fathers were to attend a dinner at the Coliseum. The Chicago Automobile Club is very anxious to see the committee kill the numbering

ordinance now before it, and it seems to be its intention to influence the committee in this respect by demonstrating the lack of necessity for such numbers. The committee were also to be conducted around the Show and to be made acquainted with the vast financial interests involved in the automobile business.

A meeting in the interests of good roads is to be held in the Auditorium on Friday evening of this week, under the joint auspices of the N. A. A. M. and the National Highway Commission. Quite a number of prominent speakers are on the program to address the meeting, which will be presided over by Mayor Harrison of Chicago. On Thursday evening the N. A. A. M. will give a smoker and vaudeville exhibition to the Show attendants and members of the trade at the Show. The annual meeting of the N. A. A. M. at New York recently was adjourned to the Chicago Show, and it is expected that another meeting will be held on Saturday day evening next, at which the question of the most important endurance contest for next season will be discussed and be put into definite shape. At the New York meeting the proposal of holding a contest between New York and Chicago met with considerable favor, and it is not unlikely that the association will recommend such a contest at this meeting.

Returning to the exhibits, they are naturally not so much crowded as they were in New York, while the decorations are in general of the same order. Palms are used for decorations on not a few stands and some of the exhibitors have surrounded their stands with rows of electric incandescent lamps stretched between the tops of the arc light posts. Strips of green and yellow bunting cover the inside of the dome of the building and the same color of bunting is used in the decoration of the gallery. Electric lights are used to such an extent by the exhibitors that the lighting plant capacity of the building had to be doubled.

Most of the exhibitors of automobiles have vehicles in the street for demonstration purposes, and as the Coliseum is only one block away from Chicago's magnificent boulevard system, the opportunity for demonstrating the running qualities of the vehicles on smooth, level streets is unsurpassed. The other kind of streets is also not wanting in the vicinity. The municipal government of Chicago showed itself very accommodating in offering to loan city license badges to any visiting automobile owners or professional chauffeurs who wish to drive any of these demonstration machines during the week, the management of the Show assuming the responsibility. A further attention of the city authorities toward the Show deserves mention: a special force of men was put to work on some of the cross streets between Michigan avenue and Wabash avenue, near the Coliseum, to thoroughly clean these streets, over which the automobiles have to pass to reach the boulevard system from the Show.

Coming so soon after the New York Show, there are, of course, not very many new machines exhibited, and those are mostly from the West. Among the vehicles not shown at New York are the Glide mobile, manufactured by the Bartholomew Company, of Peoria, Ill.; the Welch touring car, of the Chelsea Manufacturing Company, Chelsea, Mich.; the Columbus motor truck, of the Columbus Motor Vehicle Company, Columbus, Ohio; the Flint roadster, of the Flint Automobile Company, Flint, Mich.; the "Jaxon" steam car, of the Jackson Automobile Company, Jackson, Mich.; a gasoline car by C. W. Russell, Springfield, Ohio; the Speedwell car, of the Speedwell Automobile Company, Milwaukee, Wis., and the Union automobile, of the Union Automobile Company, Union City, Ind. A few of these cars are described in the following article, and the rest will receive attention in our next issue.

Welch 1903 Touring Car.

Some New Vehicles at the Show.

THE WELCH TOURIST.

The car herewith illustrated is manufactured by the Chelsea Manufacturing Company, of Chelsea, Mich. Its principal features are spiral gear transmission and a telescoping steering post.

The vehicle is equipped with a vertical, double cylinder motor rated at 20 horse power. The motor is supported j hind the front axle between two seamless steel tubes, extending from the rear axle and supported o elliptic springs in front, entirely in ent of the body frame. The engi designed to run at low compression constructed with both intake and valves opening directly into the cy The exhaust valves are 1¾ inches i eter, and owing to the large size valves and the fact that they open into the cylinder, the engine is cla run as high as 2,000 revolutions p ute and at 800 to 900 revolutions speed, corresponding to a vehicle s 20 miles per hour on the high gear.

The transmission is composed o noiseless, hardened steel spiral gea by means of three additional stee gears a hill climbing speed and rev obtained. On the high speed th gears remain stationary. The ge controlled by a single lever.

The ignition is of the jump spa and the current is supplied by two b of three cells each. A single coil vibrator is used for both cylinde primary make and break being fitt heavy platinum points and protecte oil and dirt. The carburetor is con with a heating jacket. The engine ed by means of a crank located in the engine in the usual French r The cooling water of the engine is through a honeycombed radiator, have over 50 square feet of radiati face in a space of 16x16x3 inches constructed of a cast brass frame, w filled with over 3,000 one-quarter in agonal brass tubes, with the ends e tightly, and the whole is made on mass by dipping it into molten meta water finds its way in thin sheets the tubes from top to bottom, requi circulating pump or extra tank. blows through the tubes longitudina air circulation being forced by a rectly behind the cooler. The cool tains only two gallons of water, wh run the machine indefinitely, it is c

The vehicle has a 78 inch whe standard 56 inch tread and weigh pounds. It has a tonneau body.

THE GLIDE MOBILE.

The Bartholomew Company, of Ill., are introducing to the public Chicago Automobile Show a new r weight vehicle of the runabout typ frame is constructed of angle steel connected with the rear axle by m quarter elliptic springs. At the fr frame is pivotally supported on th carrying frame. Distance rods a vided between the engine frame a rear axle to adjust the tension of th ing chain. The wheels are of the st pension type, 32 inches in diamet fitted with 3 inch pneumatic tire rear axle runs on four hardened stee bearings, one bearing near either

le and one on each side of the com- ing gear. The front axle is provided all bearings.

vehicle is propelled by a single cyl- four cycle motor of 5 inches bore inches stroke. The cylinder and chest are water cooled and the valve and levers are encased. The speed of gine is controlled by throttling the by means of a foot lever and by ing the time of the spark. It is d that the speed may be varied be- the limits of 100 and 1,200 revolu- per minute. The water jacket around linder is separate and is packed at ont with metallic packing. The cyl- head is attached with six 9-16 inch and the packing is said to give no . The motor is started by means of chable starting crank inserted through ning at the side of the frame.

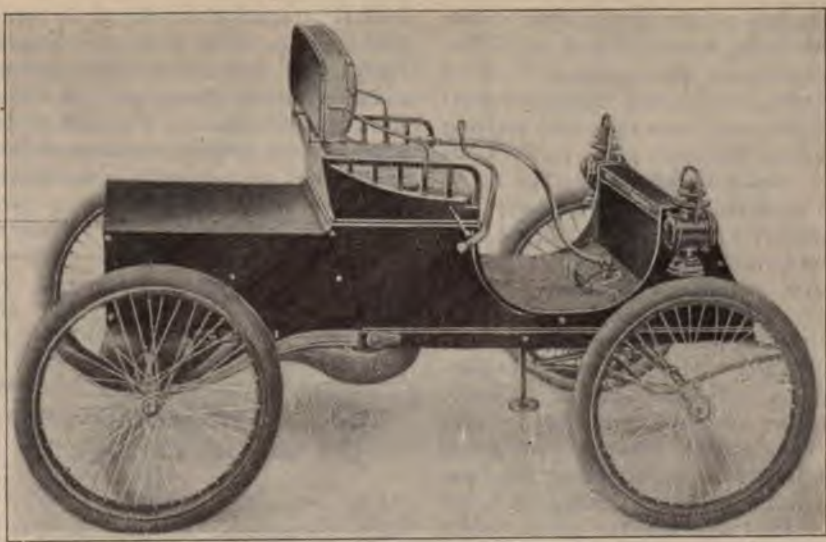
tion is effected by means of the jump with current supplied by a dynamo, tter being driven by friction off the el. In addition to the dynamo a bat- of four dry cells is carried and a permits the operator to use either attery or dynamo as desired. The plug furnished with the machine is sulated with mica.

carburetor is of the float feed type provided with a throttle valve in the ssage. The construction includes a ar system of air passages through a rical entrance. While the vehicle is ng the vapor that rises from the jet with the air so that the engine may rted at any time without any prelim- operation of the carburetor.

transmission gear is of the sun and type and gives two speeds ahead and everse, all these changes being ob- with only nine gear wheels. The are made of machinery steel and case ned and the friction bands are lined sections of wood fibre. The power nsmitted to the rear axle by a Dia- block chain of 1½ inch pitch and alf inch width. The compensating is of the spur type, with pinions cut machinery steel bars and main gears osphor bronze. The two master gears eared to the axle shafts and the whole ensating gear is enclosed in a casing. body is mounted on a spring frame endent of the engine frame and be easily removed without disturbing f the machinery. The body frame is ed with polished sheet steel and the rs are made with nickel plated hex- head bolts.

he Geneva Steam Tonneau.

Geneva Automobile and Manufac- Company exhibited at recent shows roit and Cleveland a new steam tour- r with large and roomy body, which riefly referred to in our last issue. ehicle is equipped with a semi-flash consisting of a series of tubular disposed vertically side by side. The upper ends of the coils connect to a header on top of the generator and the lower ends project from the centre downwardly to connect to a header which extends transversely across the generator coils below. The generator is located under the bonnet in front of the vehicle. The separate coils are thus disposed vertically instead of horizontally, as is the usual practice, and the flame from the burner rises between the coils.



The Glide Runabout.

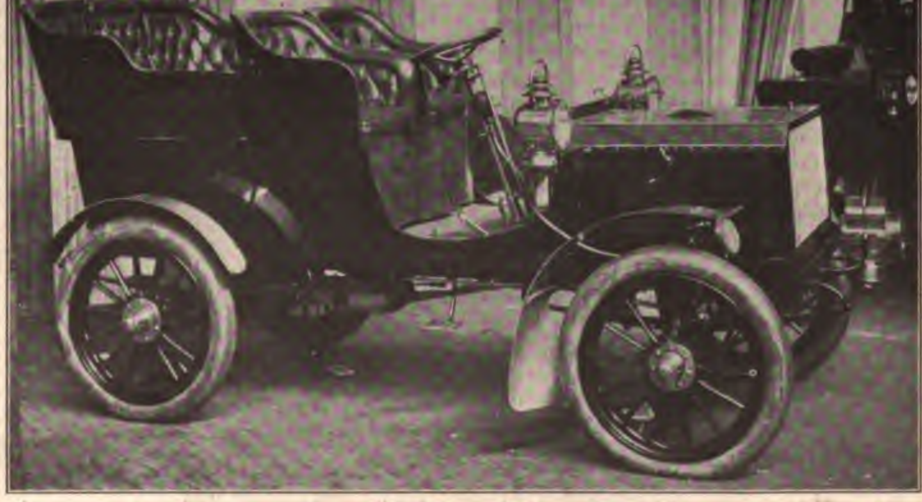
The water is fed into the lower header by means of a force pump driven through an eccentric on the rear axle, and the pump makes one stroke to every three revolutions of the engine. The water rises from the lower header through the tubes and is said to be converted into steam at a certain part of these tubes, being superheated while passing through the upper part of the coils and in the upper header. The water tank holds 20 gallons and is placed under the front seat.

The burner is of the spiral coil type, a design original with the company, and uses either kerosene or gasoline, a special vaporizer being of course used for kerosene. The fuel is carried in a 15 gallon tank under the front seat, and one supply is claimed to last for a run of 150 miles.

The engine is the regular two cylinder marine type, but is arranged horizontally and is geared directly to the rear axle. The engine crank shaft, reverse gear, etc., are enclosed in the casing of the differential on the rear axle and run in an oil bath. The crank shaft bearings of the engine are rigidly supported on the rear axle, but the cylinder end is supported from the body by means of a pivot joint which allows free spring action without disturbing the connections to the engine. The engine is reversed by means of a sliding sleeve on the crank shaft operated by a foot lever. The steam is led from the boiler to the engine through an uncovered steam pipe beneath the foot board, it being thought advisable to let it slightly cool down—that is, to lose some of its superheat—before entering the cylinders.

The exhaust steam of the engine passes into the condenser in front, which consists of flattened copper tubes arranged directly below the wire screen in front of the bonnet.

The engine is lubricated by means of an



The Geneva Touring Car.

oil pump driven from the eccentric on the rear axle which drives the feed pump. The oil is fed to the steam pipe in front of the throttle, to give it a chance to thoroughly mix with the steam, thus insuring that every wearing part receives its proper amount of lubricant. The oil is carried in a tank between the body and the radiator, which insures it being kept at an even temperature whatever the atmospheric temperature may be.

The vehicle is steered by a hand wheel on an inclined post and the throttle lever, gasoline valve and bypass valve are arranged on the steering post. Double band brakes are fitted to each of the rear wheel hubs and an auxiliary hand pump for the feed water is located on the right side in front of the seat board. The air tank is located under the bonnet right behind the burner.

The vehicle is equipped with 30 inch artillery wood wheels and 3½ inch clincher tires. The body frame is of angle iron and is supported on four semi-elliptic springs. The car complete, with tanks filled, weighs 1,600 pounds.

The Proposed Commercial Vehicle Trials.

Nothing daunted by the unfavorable attitude of the N. A. A. M. toward holding a contest of commercial vehicles this year, the contest committee of the Automobile Club of America has sent the following letter to about seventy-five commercial houses in this city:

"The Automobile Club of America, as you perhaps know, is an organization, one of the purposes of which is to encourage the introduction and use of all types of self propelled vehicles. To this end the club has from time to time held contests for automobiles to demonstrate their reliability as a pleasure vehicle.

"The board of governors of the club have now instructed their contest committee to hold a contest in the spring, probably in May, for commercial vehicles of all types, including heavy trucks and delivery wagons, as well as light delivery wagons, propelled by gasoline, steam or electricity.

"It is the intention of the club to determine by this contest whether the time has arrived when it can be satisfactorily demonstrated that self propelled vehicles can be used in commerce at less cost and to greater advantage than the present horse drawn vehicles.

"We believe that this question cannot fail to interest you, and the contest committee is anxious to secure the views of gentlemen who are in charge of the deliveries for large commercial institutions in the city, with a view of making the contest cover the ground most desired by the companies delivering goods in New York and vicinity.

"If your company would have the gentleman in charge of your delivery department meet this committee at the clubhouse, 753 Fifth avenue, New York, on Thursday, February 19, at 4 o'clock in the afternoon, and talk over the matter, we think it would be of mutual interest. We wish to learn what are the general requirements for a long as well as a short haul, and for both light and heavy vehicles."

LESSONS OF THE ROAD

Two Years' Experience with a Gasoline Carriage.

By J. H.

(Continued.)

It took about two weeks to overhaul the carriage and make the repairs which seemed to be most needed. I did a good deal of it myself in order to become familiar with the interior construction, for I have found in my brief experience that I might be called upon at almost any time to demonstrate to a sidewalk audience how much I didn't know about this particular auto. So I just donned a pair of overalls and jumper, and soon had that outfit spread out over the stable floor, and it looked as if there were enough pieces lying around to construct several autos.

I found that nearly every bolt and nut in the outfit was loose. These were gone over carefully, and some of the more important ones were drilled and provided with cotter pins to prevent their coming out in case they worked loose again. I had been considerably annoyed when riding over pavements, by a persistent and very disagreeable rattle, which I had not been able to locate. A careful inspection of the reaches and steering gear solved the mystery, for the holes in the reaches where they were bolted to the axles had worn so as to leave them very loose, while the steering apparatus was in about the same condition. This state of affairs showed poor construction, for the carriage had not been run over a thousand miles, and still these parts gave evidence of excessive wear, which would not have been the case had the ends of the reaches been made of solid stock, with some provision for taking up the wear, instead of being pieces of tubing flattened out and bored, leaving a wearing surface of less than one-quarter of an inch to stand the severe strains and racking effect to which this part of the apparatus is subjected. However, after having the reaches fitted with solid ends, and having the holes in the steering device bored out and fitted with bushings, I have been able to ride over miles of pavements and rough roads without the tin pan accompaniment that had formerly seemed to be inseparable from my carriage.

RUBBER HOSE WORN BY CHAIN.

While making a careful survey of the under part one day while the repairs were in progress, I discovered that the rubber hose forming the connection between the engine and tank had been worn nearly through by the chain which lay directly on it. A piece of tin had been wrapped around it for protection, and this was worn through. Had I not discovered this in the stable it would undoubtedly have been brought to my attention under less favorable circumstances. I have failed to discover any plausible reason for its being put where the chain could drag upon it, and changed it so that I do not anticipate any further trouble from that source.

I had noticed on the last trip with the carriage that the engine missed explosions occasionally. An inspection of the contacts of the igniter (of the make and break variety) showed the platinum points to be badly worn; these I replaced by special hardened points made by a well known platinum manufacturer, and they have run an entire season, being cleaned but once, and are in as good condition apparently as when put in.

REPLACED WET WITH DRY CELLS.

I next directed my attention to the batteries, as I had become somewhat suspicious of them. An amateur test showed the amperage to be quite low, and as they were liquid cells, very heavy and taking up considerable room, I decided to discard them, and use instead dry cells taking up less room, which enabled me to carry an extra set, wired to a double throw switch so that either set could be used.

I next rewired the carriage, replacing the old lamp cord with which it was wired with heavy stranded rubber covered wire run in flexible conduit. This, I am convinced, saved me from trouble later on, as I have seen several autos stalled while their owners vainly hunted for breaks that were sure to be at some point difficult of access.

After having made the above changes and a few others of minor importance, I began to look forward to the next trip, which I decided I would make the following Sunday. The day dawned bright and clear, and I was up early and soon had things in readiness. My wife had mustered up sufficient courage to accompany me, and we decided to visit some friends who lived in the country about 10 miles from our city. The roads were rough and sandy, but the auto never faltered, and we were soon at our destination.

After inspecting the outfit, I took one of my friends aboard and we started for a short ride, going about 8 or 9 miles over some very rough and hilly roads. Everything worked beautifully, and I began to feel that my labors had not been in vain. On reaching the house again another of the family was taken for a short ride. After going about a mile upon a very narrow road we turned a sharp corner and came face to face with an ancient specimen of horseflesh with a carryall full of frightened natives, evidently returning from church. They immediately alighted from the vehi-

ith more haste than dignity, and be- empty the vials of their wrath upon ead for daring to obstruct the high- with such a dreadful looking, noisy hing. I decided that discretion was etter part of valor, and, on being tly requested by one of the party to ack, attempted to do so, but the road ery narrow, and in turning it was sary to back into the gutter, and we very near getting stuck in the mud. fter several attempts we pulled out arted back. When within a few hun- feet of the house the engine stopped nly. An attempt to start it by crank- howed a loss of compression, and I to realize that I was up against hing new. I put on my emergency and assumed a horizontal position th the carriage to obtain a better view under part of the engine. While in osition the party whom we had met urned back for drove by, and their ks did not indicate that they sympa- with us in our misfortune.

INLET VALVE OUT OF ORDER.

oon found the trouble to be in the valve; the pin holding an adjusting ad worn off and let the nut work and this reduced the tension on the spring so much that it did not close alve—hence our loss of compression. ad some trouble in finding a nail of r size to make a new pin, but finally one that we filed to a fit, and were on our way again, and reached our ls' house without further mishap.

our trip home my wife decided that ould go by train, as the little episode ed to did not tend to increase her dence in the auto. So I drove her to tation, and there met a friend whom ited to ride home with me. The invi- n was accepted and we arrived home ut further trouble, making the 10 in thirty-five minutes, which was t half the time I required to do it my horse.

is experience impressed me with the ssity of being prepared for these little ks, and I now carry along a miscella- s collection of nuts, bolts, screws, etc., together with plenty of good g wire, which I have had occasion to everal times patching up broken har- s and wagons, caused by horses who ot take kindly to the auto.

r next trip was taken a week later. were invited by several of our friends owned steam carriages to accompany on a run to a city 26 miles away, we were to take dinner. As I had ly gasoline machine in the party, and ewhat noisy one, I had to stand con- ble jollying about it at the start, both count of noise and size, as it weighed 1,800 pounds. But I had the laugh em before we had gone a dozen miles, ere were burner troubles, engines to pumps to pack and water to take d, while I sat in the carriage and had le fun at their expense. It became evident to me before we had gone many miles that I had been invited to accompany the party in order that the steamers might be given an opportunity to do up the ice wagon, as one member referred to it. But we had no difficulty in demonstrating our ability to take care of ourselves, and were on hand for dinner when the rest of the crowd lined up for that purpose.

We had further opportunity for comment after dinner when getting ready for our homeward trip. My friends with the steam machines found they would be obliged to renew their gasoline supply in order to get home, while I had enough to get home on and some to spare, although my tank held no more than theirs.

We had to run nearly 4 miles to get gasoline, after which we started for home. When about half way we were overtaken by a severe thunder shower.

The steamers were all open carriages, and in consequence their occupants were obliged to seek shelter or get drenched, while with our top up and boot on we were nicely protected, and experienced no discomfort from the storm.

The roads were somewhat heavy after the rain, and here again the gasoline machine showed superior ability, for we made much better headway than the light steam carriages and had to wait for them quite frequently.

GEARS STRIPPED.

It was not without some misgivings that I started on the trip, for in driving the machine around town a day or two before I noticed a peculiar sound in the gear box; an examination on reaching home revealed a shortage of several teeth in the differential gear. There not being time to get a new one, and not wishing to miss the trip, partially on account of the comments that my friends would make, I determined to make a temporary repair. I drilled into the gear and tapped the holes, and then took some three-eighth inch set screws and ground them as nearly as possible to the pitch of the gear teeth. These were then annealed and screwed into the holes in the gear, set so as to mesh with the pinion, and then headed in to prevent their turning, and while I only intended this to carry me on the trip I have mentioned, it ran over 400 miles before the teeth worked loose.

The time consumed in doing the job was a little less than three hours. I wonder what the bill would have been if I had taken it to some of the high priced repair shops?

I only used the carriage on a few short trips about town the rest of the week, but the first of the following week I made a trip to Portsmouth, N. H., and return, a distance of about 90 miles. We were accompanied on the trip by two friends in a steam carriage, and made the run without a mishap of any sort, our average speed for the trip being about 15 miles per hour. Our gasoline consumption for the 90 miles was exactly 5 gallons, while the light steam carriage, weighing not quite one-half as much as our machine, used 12 gallons. Everything ran along beautifully for the next three or four weeks. We took a number of short trips, and had no trouble of any kind, but had loads of fun.

OFF ON AN AUTO TOUR.

My family having gone to a seaside resort in Maine for the summer, I decided that I would make the trip there by auto, the distance being about 65 miles, the roads being quite good the greater part of the way. I had planned to go alone, but a friend of mine mentioned that he was going to Kennebunk that day, and that being only a few miles from York Beach, my destination, I invited him to accompany me. We decided to make an early start, and got everything in readiness the night before. We were up by daylight the next morning, and after eating breakfast started on our journey. Our route lay through Haverhill, Groveland and Newburyport, and from there to Salisbury, Hampton and Portsmouth, and from there to York.

The ride from Haverhill to Newburyport was one of the finest I had ever taken. The roads were macadam nearly all the way, and ran for some distance parallel with the Merrimac River.

It was a beautiful July morning, the air was clear and bracing, and the ever changing scenery lent an added charm. The sun was just rising above the hilltops when we sighted Newburyport, and a few minutes later we passed through the town and over the ancient wooden drawbridge crossing the river that looks as though it had done service for many generations. We made no stop until we reached North Hampton, where we added a little water to our cooling supply, and took up the chain, which seemed a little too loose. Before doing this I stopped the engine, and after making the chain adjustment tried to start it, but the most vigorous cranking on my part produced no results. A careful examination failed to show anything wrong. I tried again, and this time my efforts were crowned with success, and my brow was covered with perspiration, but the engine seemed to be trying to make up for lost time, and ran better than it had during the entire trip. It was about 8:30 when we landed in Portsmouth, making the 50 miles in a little over three hours, including our stop for adjusting the chain.

(To be continued.)

"Science Abstracts," London, will hereafter be published in two sections, Section A dealing with physics, and Section B with steam plant, gas and oil engines, and automobiles. The American Physical Society is now joined with the Institution of Electrical Engineers and the Physical Society, of London, in the direction of the publication, and has elected Prof. E. H. Hall, of Harvard University, as its representative in the publishing committee.

NEW VEHICLES AND PARTS.

The Locomobile Gasoline Touring Car.

The gasoline touring cars now manufactured by the Locomobile Company of America, after designs of A. L. Riker, are, generally speaking, of the French type, but they embody enough original features to well merit a detailed description. The cars are made in two sizes, a four cylinder, 16 horse power, and a two cylinder, 9 horse power size. Both machines have cylinders of the same size, but the two cylinder motor is speeded up a little higher, which accounts for its being rated at 9 instead of 8 horse power. The change gear, gear frame, etc., are exactly the same in the two cars, except as regards dimensions, and only the four cylinder vehicle will be described here.

Fig. 1.

THE RUNNING GEAR.

The running gear frame is a special patented construction, illustrated in Fig. 2 herewith. The main frame consists of a single rectangular piece made out of several pieces of angle and channel steel by the electric welding process. The control parts A A of the longitudinal frame bars are of channel steel, and the ends B B B B of the longitudinal bars of angle steel, the height of the vertical flange of the angle section decreasing toward the ends, in proportion to the strains upon the bars. The end cross pieces C C of the frame are of angle steel. The frame further comprises a trussed cross bar D, and a false frame for carrying the engine and gear case, composed of the transverse angle steel bar E and the two longitudinal angle steel pieces F F.

The frame is supported on the axles through four long semi-elliptic springs, insuring easy riding. The axles are solid forgings. The vehicle has a wheel base of medium length—84 inches—and a standard tread. The wheels are of the wood artillery type, of 32 inches diameter, with 3½ inch detachable tires. The wheel bearings are plain, the axle spindles being hardened and ground, and the wheel hubs provided with special means of lubrication. The hub is provided with a cap at its outer end, and the space between this cap and the axle spindle end can be filled with oil through an opening in the cap. Spiral grooves are cut in the bearing surface of the axle, and the oil finds its way through these grooves to all parts of the axle bearing.

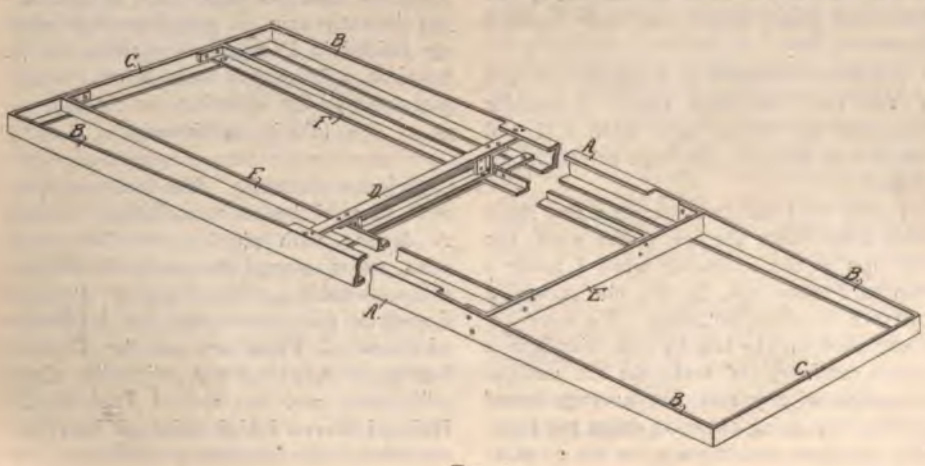


Fig. 2.

THE ENGINE.

The engine is a four cylinder, vertical one of 4 inches bore and 5 inches stroke. It is rated at 16 brake horse power at 900 revolutions per minute. A vertical section through one of the cylinders is shown in Fig. 3, a photographic end view of the engine in Fig. 4, and side view from the valve chamber side in Fig. 5. The cylinders are cast in pairs, and integral with their heads and valve boxes. All parts exposed to the heat of the burning gases are surrounded by the water jacket. The compression is carried at 75 pounds gauge or 90 pounds absolute. The exhaust and intake valve are arranged in line with each other on one side of the cylinder, the latter valve being automatic or operated by suction. The admission valves have a flat seat, while the intake valves have a conical seat of 45 degrees. The crank chamber of the engine is made in two halves, with a horizontal joint through the centre of the crank shaft bearings. The upper half is of bronze and the lower half of aluminum. The crank case forms two nearly spherical chambers, one for each pair of cylinders, and the crank shaft rests in three bearings, one bearing at either end and one between the two crank chambers. The crank is in one piece composed of two so called "double throw" parts, one located in each of the crank chambers, with a bearing journal between these two parts. The cam shaft is driven by spur gears, which are located outside the crank chambers and enclosed in separate casings.

The engine is lubricated on the splash system. An oil reservoir is arranged at the side of one pair of the cylinders, on a level with the top of the latter. A pipe leads from the bottom of this reservoir and divides into two branches, one leading to each of the crank chambers. A shut-off valve is placed in the upper part of the piping, where all the oil flows through a single tube, and a sight feed (Fig. 4 on the left) is located in each of the two branches. Standpipes or overflow pipes extend into the crank chambers from the bottom to the level at which it is desired to carry the oil in the case, and these pipes are provided with cocks at their lower ends, as plainly seen in Figs. 4 and 5. It will be noticed that a groove is cut around the cylinder on the inside, a couple of inches from the lower end of the cylinders, and that a return passage is provided from this groove to the crank chamber by means of the pipe. This arrangement serves to prevent an excess of oil getting into the cylinder.

The cam shaft is located in a special chamber adjoining the crank chambers, the engine in this respect resembling the Panhard engine. The push rods for the exhaust valves are provided with cam rollers, and guides for keeping them from turning in their bronze bushed bearings.

At their upper ends the push rods carry an adjustable head. A small feature of some originality is a lug (L, Fig. 4) on each cylinder, right opposite the exhaust valve stem, by means of which and a special tool provided the exhaust valve can be readily lifted if it should have become gummed in its seat or the stem stuck in the guides.

The upper part of the crank case is cast with two long brackets, by which the engine is supported on the false frame.

Attention should be called to the manifold casting, by which the various exhaust valves communicate with the single exhaust pipe. This manifold connection runs parallel with the crank shaft, and is cast with a number of external flanges, both longitudinal and circumferential. By means of a piece of sheet metal a chamber is formed between some of these flanges and the wall of the manifold itself, through which some of the air for the carburetor is drawn, causing it to be heated.

INTAKE VALVE CAPS.

One of the most original features of the engine is the construction of the intake valve housing, which is illustrated by Fig. 6. The seat A of each intake valve is made dome shaped, but open at the top and provided with an external circumferential flange which fits into a counterbore on the top side of the valve chamber. This seat, as usual, is provided with a central guide for the valve stem supported by a three arm spider. The hollow connection piece B is solidly bolted down to the valve chamber by means of the studs C C and nuts thereon. The open ends of this connection piece are located between the open ends of the valve domes and on an exact level with the latter. Communication between the connection piece and the valve dome is established by means of caps

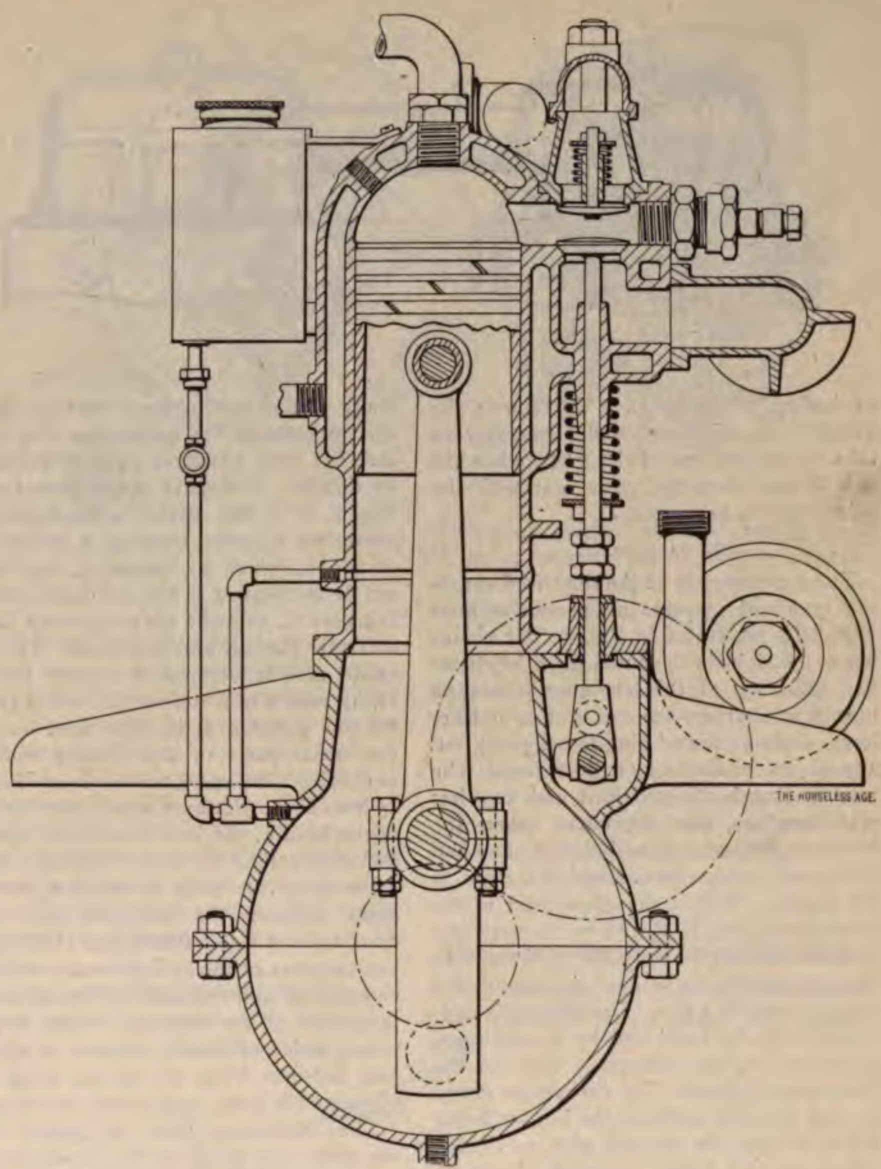


FIG. 3.

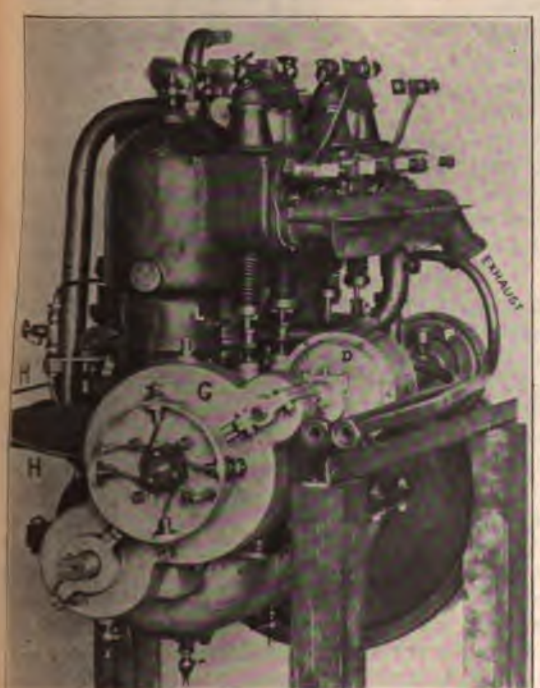


FIG. 4.

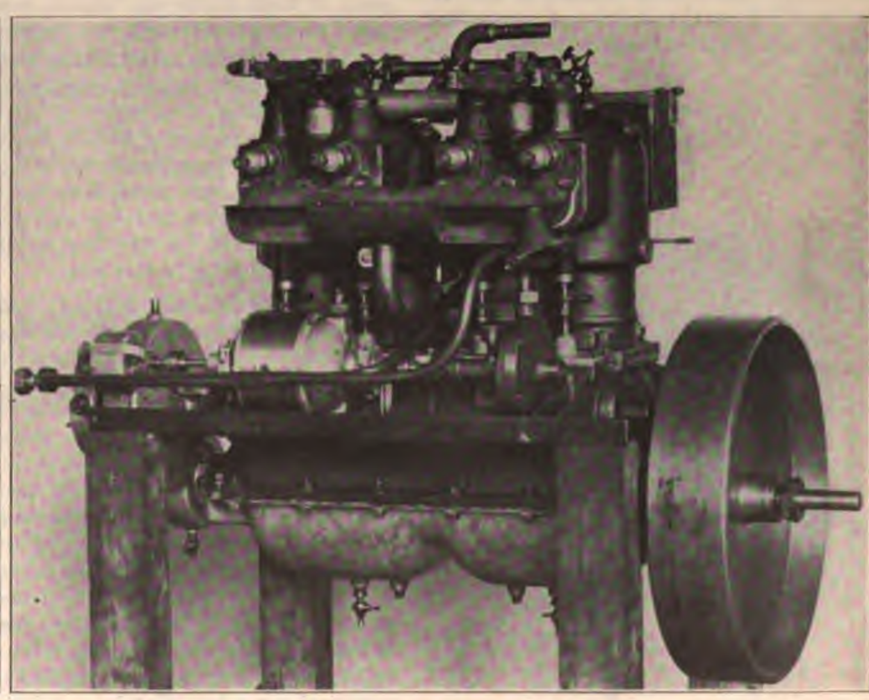


FIG. 5.

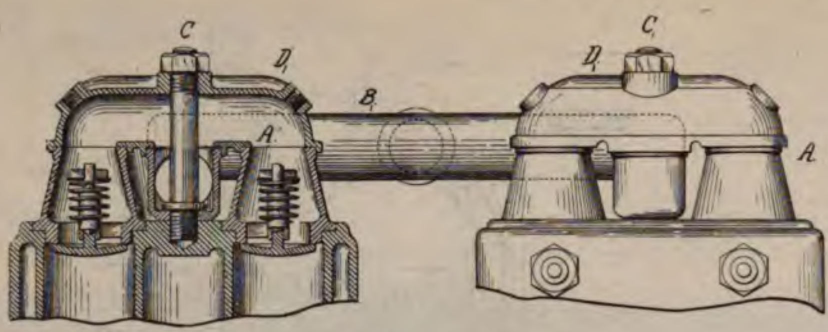


Fig. 6.

or hollow yokes D D. To remove the valves it is, of course, only necessary to take the nut off one of the studs, when the cap D and then the valve seat with the valve may be taken out.

THE CARBURETOR.

The carburetor is of the float feed spraying type and presents no particular novelty. It is illustrated in Fig. 7. The chamber at the right in the cut is the float chamber. On top of this chamber is seen a button for starting the carburetor, and below a drain cock and plug for cleaning out any impurities that may collect there. The mixing chamber is provided with two lateral openings, one above the other, the lower one being for the admission of air and the upper one for the passage of the gas to the engine. Within the upper part of the mixing chamber is placed an inverted cup with an opening in the wall, to form with the opening in the wall of the chamber a register throttle valve. The throttle is controlled both by hand and by a centrifugal governor, as the connection rods on the illustration indicate. The carburetor draws in both hot and cold air, the hot air being drawn around the exhaust pipe, as already explained, and being incapable of regulation, while the cold air is taken in through an opening on the dashboard, controlled by a register valve, directly in front of the operator.

THE IGNITION SYSTEM.

The ignition is by jump spark, and a study of the various parts making up the system conveys the impression that much care has been bestowed upon working out its details. The spark plug, illustrated in Fig. 8, is of Mr. Riker's own design. It comprises a central terminal A in the form of a bolt, which by means of the capped nut B is clamped in the porcelain insulating core C, asbestos packing being inserted under the nut and bolt head. The porcelain core is clamped in a metal housing D, by means of a follower E, and a cap F, suitable packing being also used between the metal parts of the housing and the porcelain. The spark terminals are formed by two short platinum wires, one fastened in the head of the bolt A and one into the threaded part of the metal housing. A peculiarity of the plug is the thin annular space between the porcelain and metal housing, and it is claimed that as the gaseous contents of the cylinder are alternately compressed and expanded a vortex motion is formed at the opening of this annular space, which efficiently disposes of all carbon deposits from oil on the plug, and prevents the plug from short circuiting.

The connections from the spark coil to the plugs are made by extremely heavily insulated stranded cables, and by a short piece of brass chain—the latter a new feature which likely will be extensively copied. This chain takes up the vibration of the machine, and the objection that might be made, that some of the links might be thrown out of contact by the vibration just at the moment when the current passes through them, does not hold, as it is well known that the high tension current will easily bridge any small gap that may be formed in this way.

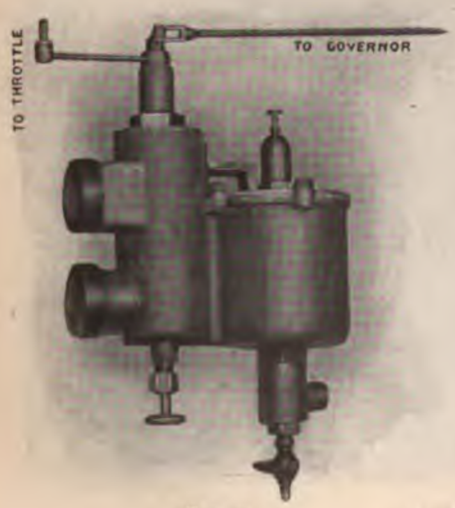


Fig. 7.

Four separate coils with a magnetic buzzer each are used, and these are put up in a hardwood box, which is attached to the dash board on the rear side, with ha-d rubber insulating feet. The current for ignition is supplied by a storage battery in starting, and by a dynamo (D in Fig. 5) in normal operation. A double two cell storage battery is carried in a box on one of the carriage steps. One battery is connected up for action, while the other one is entirely disconnected. Each of the batteries is claimed to be of sufficient capacity to supply the current for ignition for 1,000 miles on one charge. The dynamo is automatically cut into circuit at a little below normal engine speed, and charges the storage battery in circuit at the same time that it supplies current for the igniter.

In Fig. 5 the case marked G incloses the cam shaft gear and the centrifugal governor. Right in front of this box will be seen, arranged on the cam shaft, the commutator or circuit breaker—i. e., the device by which the current from the dynamo or battery is successively led into the four separate coils, and by means of which the period of the spark, with relation to the engine cycle, can be varied. The centrifugal governor acts both on the igniter and the gas throttle, the connection to the throttle being shown by H in Fig. 5. The details of the governor and the commutator are shown in Figs. 9 and 10. Fig. 9 is a plan view of the cam shaft gear and of the governor located within this gear, and Fig. 10 is a section through the cam shaft gear, governor and commutator.

THE GOVERNOR.

Referring to these two figures A is the time shaft pinion on the engine crank shaft; B the gear on the cam shaft, which has, of course, twice as many teeth as the

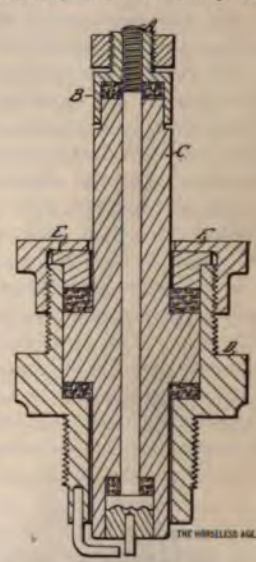


Fig. 8.

pinion; C a small diameter gear in mesh with B, which drives the dynamo and the circulating pump. The dynamo and circulating pump are driven at about two and one-half times the speed of the engine. Two lever arms D D are pivoted to lugs projecting inwardly from the rim of the gear wheel B at diametrically opposite ends. These lever arms at a certain part of their length carry the governor balls E E.

The outer ends of these lever arms are drawn toward the centre of the gear by coiled springs F F, the fixed ends of which are attached to the lugs to which the lever arms are pivoted. The movable ends of the lever arms also connect by links G G to a double armed bracket H loosely mounted upon the cam shaft. When the gear turns at a considerable speed, the centrifugal force causes the balls to fly outward and the springs to extend, as indicated by dotted lines, and this in turn

causes the double armed bracket H to slightly rotate around its shaft. This double armed bracket is fastened upon a sleeve on the cam shaft, which at its opposite end carries the commutator wheel L.

The bracket is also connected by lateral studs M M extending through the gear B to a grooved collar N, the hub of which is provided with a spiral slot, as shown at O, in which works a pin P fastened into a fixed collar on the shaft. With the grooved collar engages a shifting fork, which by suitable mechanism is connected to a lever on the dashboard convenient to the operator. Before an attempt is made to start the motor, this lever is moved through a certain angle, which shifts the grooved collar backward on the shaft to the position indicated by dotted lines, and, owing to the pin and spiral groove, causes the grooved collar, double armed bracket, sleeve and commutator wheel to slightly rotate on the cam shaft, thereby causing ignition to occur late. When the motor has attained speed, the ignition lever on the dashboard is brought back to its original position by a kick of the foot, and the ignition is then solely under the control of the centrifugal governor.

A separate connecting mechanism leads from the shifting lever to the carburetor, thus placing the carburetor throttle under the control of the centrifugal governor. It may here be mentioned that the ignition lever on the dashboard is also connected to the valve on the engine lubricator, so that lubrication begins as soon as the spark is set back for starting the engine.

The commutator is best seen in Fig. 4. It consists of a disk of insulating material fastened upon the sleeve of the double armed bracket. A metal segment is fastened to the periphery of this disk. Four sheet metal contact brushes bear upon the periphery of this disk at equal distances, the

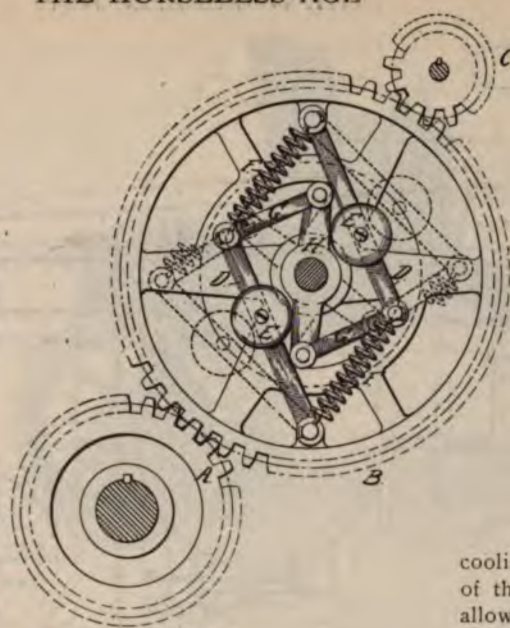


Fig. 9.

brushes being supported by studs clamped into the casing of the commutator wheel by means of insulating washers and bushings. The electrical connections are made by means of clamp screws at the back of the casing. It is, of course, evident that if the commutator disk is slightly rotated around the cam shaft, either by hand or by the centrifugal governor, the spark will occur at a different period with the relation to the cycle of the engine. The whole mechanism is enclosed, as best shown in Fig. 10.

THE WATER CIRCULATION SYSTEM.

Seven gallons of water are carried for

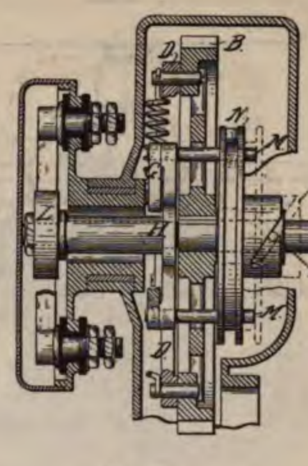


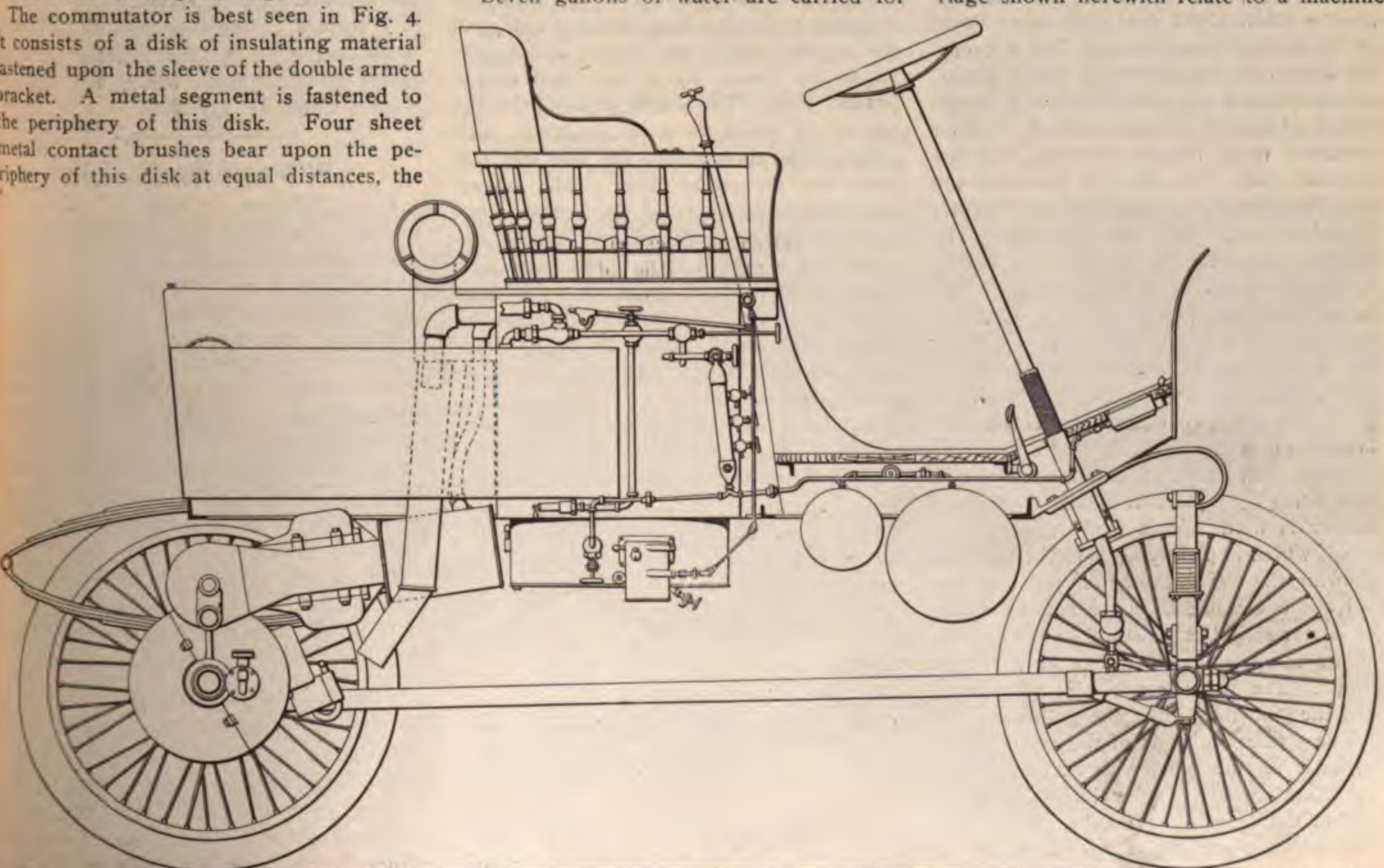
Fig 10.

cooling the engine in a tank just in front of the dashboard, placed high enough to allow of thermosiphon circulation in case the pump should fail for any reason. The heat of the cooling water is disposed of by means of a single coil radiator in front, comprising eighteen tubes, 6 inches in height and 3 inches in width. A circulation indicator interposed in the cooling system is attached to the dashboard. The gasoline tank has a capacity of 15 gallons and is arranged under the front seat, and both tanks are made of heavy sheet copper.

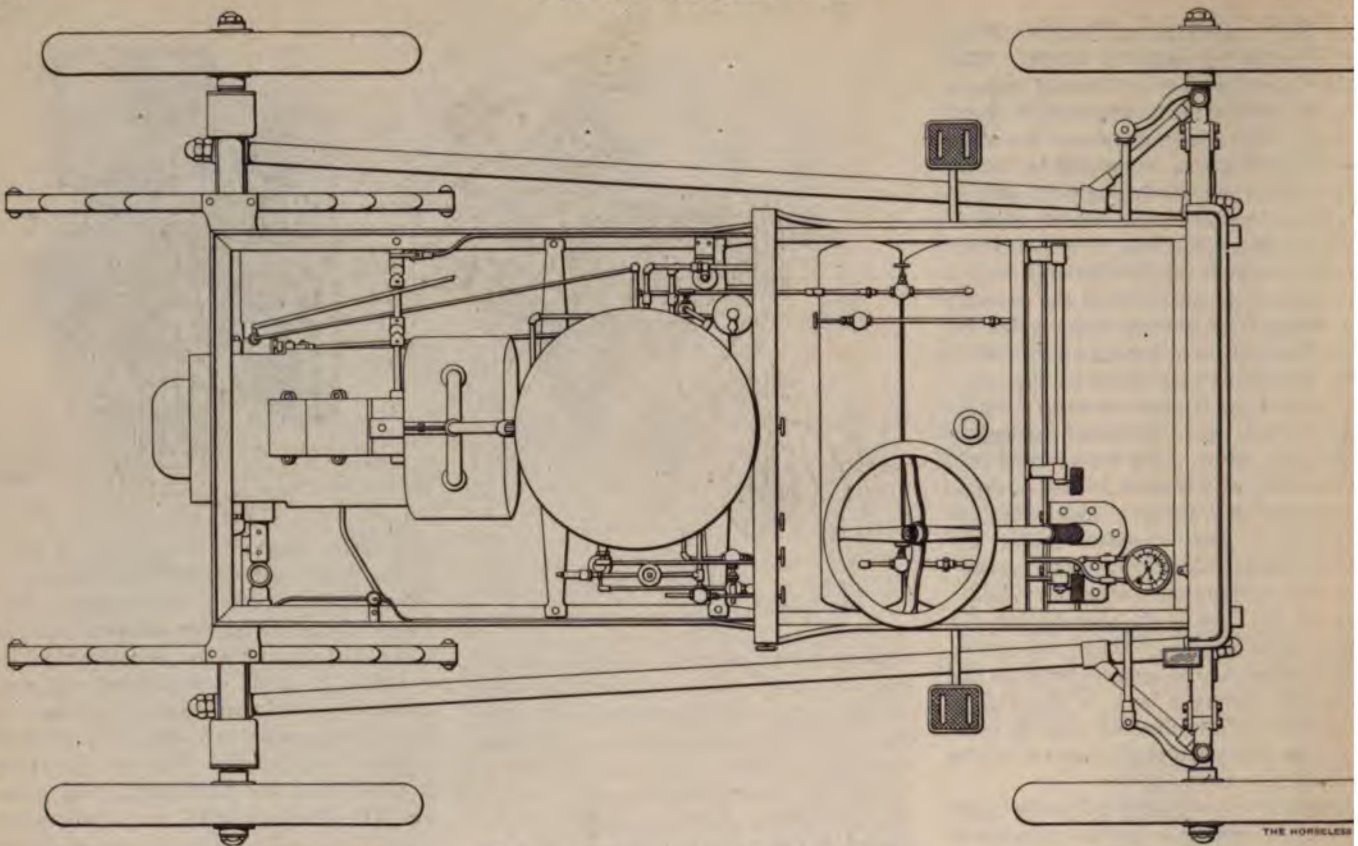
(To be continued.)

The Terwilliger Steam Carriage.

The elevation and plan of a steam carriage shown herewith relate to a machine



ELEVATION OF TERWILLIGER'S STEAM CARRIAGE.



PLAN OF TERWILLIGER STEAM CARRIAGE.

recently built by Wm. H. Terwilliger & Co., of Amsterdam, N. Y.

The carriage has a 72 inch wheel base, 56 inch gauge, 28 inch wire wheels and 3 inch G & J pneumatic tires. The running gear is tubular, the rear axle tubes being of 1⅞ inches diameter and No. 8 gauge, the front axle 1¾ inches by No. 8 gauge, and the reaches 1½ inches by No. 8 gauge. The front axle is provided with the regular standard drop forged steering knuckles and axle ends. The drive is chainless, and the differential gear located at the centre of the rear axle is of the spur type. The body is supported by 34 inch full elliptic springs at the rear and a transverse, inverted elliptic spring in front. Wheel steering is fitted, and provisions are made for varying the inclination of the steering post to facilitate ingress to the vehicle.

The vehicle has an 18 inch steel fire tube boiler, which is 16 inches high, and has one-half inch tubes, the total heating surface being 65 square feet. A Woodward burner is used, and a Kelly generator is fitted, which is plainly seen in the drawing showing the elevation of the carriage. The latter is controlled from the seat by means of a star wheel at the end of a sectional shaft, comprising a number of universal joints. The water capacity is 41 gallons, and the gasoline capacity 10 gallons.

The steam engine is of the regular twin cylinder marine type, with Stevenson link reversing gear. The cylinders are 3½ inches diameter by 4 inches stroke. All the working parts of the engine are enclosed in a dust proof casing, and run in a bath of oil. The crank shaft of the engine is of steel, hardened and ground, and runs in phosphor bronze bearings. The engine gears directly to the differential on the rear axle by means of a spur pinion and gear. The crank end of the engine is pivotally supported from the rear axle, and the cylinder end of the engine is connected to the boiler by a ball and socket ground joint. The steam passes from the top of the boiler to a seven-eighths inch copper tube through the fire box and ball joint into the steam chest of the engine. The throttle valve is of the ordinary fast opening coarse screw variety, and is operated by a curved rack. The throttle is operated in the usual manner by a hand lever, and the reverse is controlled by means of a pedal, the links being automatically held in the forward position by means of a strong string.

The main water pump is operated by an eccentric on the differential gear, and runs therefore at an abnormally slow speed; its gear is entirely enclosed in the engine case. A hand pump and a steam pump are also provided. The cylinders are lubricated by a Manzel oil pump, which is driven from the water pump. The carriage is also provided with a combined muffler and feed water heater, an ejector for filling the water tank and a fusible plug located in the bottom of the water column. The latter can be renewed after closing two valves in the water column. The steam and air gauges are combined in a single instrument on the duplex principle, and are located below the inclined footboard, so the dial plate comes even with the upper surface of this board. Miniature electric lights are provided t[o il]luminate the water glass and the s[team] and air gauge at night, and a hand cu[t-off] is fitted to the water gauge in additio[n to] the automatic check valves.

A feature of some originality is a[n air] brake acting on the rear wheels. It c[om]prises double bands, which are ope[rated] from a single air cylinder.

Williams Spark Coils.

E. Q. Williams, of Syracuse, N. Y., [has] recently increased his facilities for [the] manufacture of spark coils, and is [now] turning out a coil with contact poin[ts of] platinum-iridium, instead of plain plati[num]. A plate is placed under the rocker, w[hich] is said to greatly facilitate adjustm[ent]. The binding posts are fixed so they ca[nnot] turn around and the coils are wound [with] silk covered wire.

A special road is being built from [the] Arc de Triomphe, in Paris, to Croi[x de] Noailles, which will have special t[racks] for cycles, horse drawn vehicles and [auto]mobiles and foot paths for pedestrians. [It] is to be 40 yards wide and the total l[ength] will be a little over 11 miles.

The following figures represent [the] shrinkages of castings of different m[etals]: Zinc, .3125 inch per foot = 2.60 per [cent.]; lead, .3125 inch per foot = 2.60 per [cent.]; aluminum, .2031 inch per foot = 1.6[9 per] cent.; copper, .1875 inch per foot = 1.5[6 per] cent.; brass, .1580 inch per foot = 1.3[2 per] cent.; iron pipes, .1250 inch per fo[ot =] 1.04 per cent.

on Gasoline Touring Car.

companying photograph illus- new touring car manufactured ton Machine Company, of Bev- which was first brought to pub- at the recent Madison Square ow. The machine has a tonneau four cylindered, upright engine nder a bonnet, which causes it e in outward appearance lead- f foreign construction.

cylinders of the motor are all ate and bolted to a common The cylinder bore is 4 inches oke 4½ inches, and at a speed lutions per minute the motor is develop 16 horse power at the e crank shaft has five separate nd is therefore well supported. n carburetor is used. The en- ipped with jump spark ignition, be varied as to time by means lever on the steering wheel col- gasoline tank holds 12 gallons ater tank 20 gallons, and for water a 76 foot radiating coil ubing and with fluted coppered t by the Whitlock Coil Pipe is used, the coil being located the engine and entering the for- f the hood.

smission gear is of the sun and of the regular well known Up- and gives two forward speeds verse. On the high gear the r is, of course, entirely cut out, eduction from engine to rear hen in the ratio of 2½ to 1. It n from the illustration that the equipped with a transverse dif- aft and separate chain transmis- n of the rear wheels.

ne is constructed of 3½ inch el, rounded at each corner, with hannel or angle steel, all joints being hot riveted. The wheel base is 90 inches and the tread 57 inches, and the vehicle is equipped with 32 inch wood artillery wheels and 4 inch clincher tires. The rear wheels are equipped with brake drums integral with the transmission sprockets, and the brakes acting on these drums are said to be double acting and are operated by means of a foot lever.

The vehicle has inclined wheel steering, which, together with the power control levers, may be located on the right or left side of the vehicle. The controlling devices comprise two levers, one to engage the motor and transmission and one for obtaining the high speed; and two pedals, one for the low speed and one for the reverse. The weight is 2,490 pounds.

The Flint Roadster.

Washington, D. C., will hold its third annual automobile show March 23 to 28.

The Flint Roadster.

The Flint Automobile Company exhibit at Chicago one of their new roadsters. This machine is of 8 brake horse power, equipped with single cylinder four cycle engine, 5¼x6 inches. The carburetor is of their own design, and delivers, it is claimed, a mixture which is so nearly perfect that there is practically no odor whatever to the exhaust. The wheel base is 6 feet, with standard track. Equipments are artillery wheels, with 3 inch Diamond tires, angle iron frame 2¼x⅜ inches, mounted on three-quarter elliptic springs. A valuable feature is that there is a large hood which is left entirely vacant for storage. The seat is 43 inches wide, upholstered in the best black leather, and accommodates very comfortably three people. The machine is equipped with two speeds forward and reverse, and is capable of traveling from 6 to 30 miles per hour.

The Upton Gasoline Touring Car.

...COMMUNICATIONS...

Automobile on Runners.

Editor HORSELESS AGE:

I am sending you a photograph of my automobile equipped with sleigh runners; I have used it thus all winter, and since it has an air cooled cylinder have been able to run it in the coldest weather with perfect satisfaction. The runners are detachable and are so easy of adjustment that they can be attached or detached without difficulty.

GEO. A. LEWIS.

AUTOMOBILE ON RUNNERS.

An Improved System of Water Circulation.

CANTON, Ohio, February 10.

Editor HORSELESS AGE:

As manufacturers of radiators we know by experience and from letters of manufacturers that some engines require double the radiating surface per horse power than others do. I have noticed what C. Will Travis says on the subject on page 194 of your issue of February 4, and think that many would do well to read it. However, he does not show the best way of piping the circulating water, but contents himself with showing up some defective ways.

Vehicles are found piped in every conceivable way. It is certainly not advisable to put a tank of water to be cooled or to be kept cool on top of a hot stove or an engine cylinder. Put the tank at any other place, preferably a cool place, and take the water from the bottom of the tank first through the pump, which must be located so that the water in the tank will flow to it by gravity. The supply pipe of the pump should be large, at least double the size of the outlet. From the pump the water should be forced through the engine jacket, entering at the lowest and leaving at the highest point, then through the radiator and finally into the bottom of the tank. This will prevent any steam getting into the tank.

There are many who run the water directly from the engine into the tank. This leads the hot water, which is perhaps steaming, into the tank where the steam or vapor escapes through the overflow pipe, and causes it to be wasted rapidly. It should pass through the radiator before it goes into the tank, if it goes into the tank at all.

The very best system I know of does not send any of the water in the circulating system through the tank at all. The tank is only used to supply what is wasted or leaks out of the circulating system, and to accomplish this object the supply pipe leading from the tank to the circulating system just in front of the pump contains a check valve, this valve allowing water to pass into the circulating system but not to return to the tank, except through a safety or pressure valve located between the engine and tank. No water will pass through this safety valve except when steam is formed and the pressure of the circulating system is increased to a point determined by the adjustment of the safety valve. The water in the tank not being in communication with the circulating system, is cool, and at once condenses any steam passing into it, while new cold water flows from the tank into the circulating system and the normal condition is at once restored.

With this method 2 gallons of water in the circulating system and 2 gallons in the tank will keep a 6 horse power engine cool on the hottest days. I have made fas of 60 to 75 miles over country roads out the water ever going above 170 did not waste more than 1 quart o whole trip. I pump 4 gallons a r through the engine and radiator.

There is only one manufacturer o that I know of using this system, and surprised that others do not "catch o

E. A. WRI

Too Rapid Depreciation.

Editor HORSELESS AGE:

I imagine that I have hit upon on son why many owners want to ge machines each season, for I have been ing around the market after a decent ing car at a moderate figure. I have some and been told of many—"al new," to quote the owners. Those I seen have been in sad state when th chinery was examined. One carriage was bought in September, 1902, and only on short runs, needed complete hauling, with numerous new parts, probably a mileage of not over 1,000 if anything could be judged by the which did not show evidence of wear. small use given the carriage had wo steering gear so that holes in the co ing rods were badly torn, and the wobbled around sadly. The brakes worn out, the engine rattled, gears we of line and sung an old song out of Wire coverings were soaked with oil, ings leaked, and there was a general decay—all except the varnish and stery. Those parts looked almost new"—and maybe the owner had th side appearance in mind when he spo the condition of the machine. I cou that the machine had been given little and yet its vitals were severely str The owner said he had ordered a 190 riage, although he "had never been bo with the old one."

When a $2,000 or $3,000 machine c be put together well enough to stand a season's wear without showing the all over, there is something wrong i methods of builders. Take, for ins carriages drawn by horses in compa I have a spider phaeton for two horse I bought ten years ago, and it still h original rubber tires on the rear w The carriage is in excellent condition Horses I bought ten years ago are stil to trot around, and they are in style.

It seems singular that even the mo tute builders of automobiles cannot se they must try and build carriages that in a measure, be as reliable and end as an outfit made up of horses and riage. I cannot see any reason why a automobile should go out of fashion year, when a $600 horse drawn carriag keep in style ten or twelve years.

I have purchased a great deal of ma ery during the past twenty-five years I do not recollect that any of it depre to such an extent as do the few w valves and other bits of iron in an au

bile. I know of an automobile that cost $1,200 in 1900, and it would not bring over $250 now, because it isn't worth any more, for it is worn out with what little use it could give its owner. Judging from what I have observed in the second hand market, the later carriages are not built much better.

I have devoted a great deal of time to automobiles, and tried to keep up with the progress of events. However, some good things may have escaped me. If they haven't I see that we folks who have been looking for a carriage that will displant the horse must keep on peering into the future. Meantime we will use the automobiles when the roads and weather permit and the equines at other periods.

ROBIN DAMON.

A "Home Made" Gasoline Carriage.

WATFORD, Ont., February 7.

Editor HORSELESS AGE:

Being a constant reader of your valuable journal, I thought I would give you a description of a light gasoline runabout that I have been using for two years. I saw two automobiles before I built this one, but never was close enough to examine them. I had, however, a gasoline engine in use in my carriage shop, and therefore had an idea of what such an engine is like. I made all the patterns for the castings, did all the machine work, blacksmithing and woodwork, and put on my rubber tires. It took me about two years to complete, but this is not bad considering it was all done during spare hours.

I give herewith two illustrations and a description of the Maxamobile, as the people of the town call it. In one of the photos the car is shown with body on complete. In the other photo the body is removed. This runabout is equipped with a single cylinder, horizontal engine of 4 inches bore and 6 inches stroke. I run it at about 800 revolutions per minute. I do not know what horse-power it is, but I do know that I can carry three passengers up any hill in this country on the road. It will carry two passengers up a 15 per cent. grade on the high speed. It will run all the way from 5 to 20 miles an hour and weighs with supplies 750 pounds. It is supported on platform springs which need no radius rods and which allow the body to be set very close to the ground. The floor is only 20 inches high, still the vehicle has 30 inch wood wheels and 1½ inch hard rubber tires, which have given great satisfaction, especially on slippery clay roads. The carburetor is a simple spraying type with float of my own design. The oiler is simply a small tin can connected by a small ball valve and a needle valve, and the engine is always oiled properly. The transmission is by two belts (two speeds ahead and no reverse) running from the engine to a short countershaft which carries the differential inside the two pulleys; then by two chains to the rear axle, which is of 1½ inch solid steel in one piece, with a sleeve upon which are fastened one wheel and sprocket, and the other wheel and sprocket are fastened to the solid axle. You will notice that I use an idler which is slipped from one belt to the other. Belt transmission doesn't seem to be very popular, but it is very simple, and if properly constructed gives the best of satisfaction and does away with the slipping clutch and trouble of stripping gears; it is noiseless, and by simply slacking on your idler and changing your spark you have any speed from zero up to 20 miles an hour on the high speed belt. I use 3 inch, double thickness belts; single thickness belts were not practicable on the slow speed, as the engine would pull them apart like paper when the vehicle was on soft ground. I also use corrugated pulleys and jump spark ignition with a Splitdorf coil. The gasoline and water tanks are placed in front under the hood. The body is separate from the machinery.

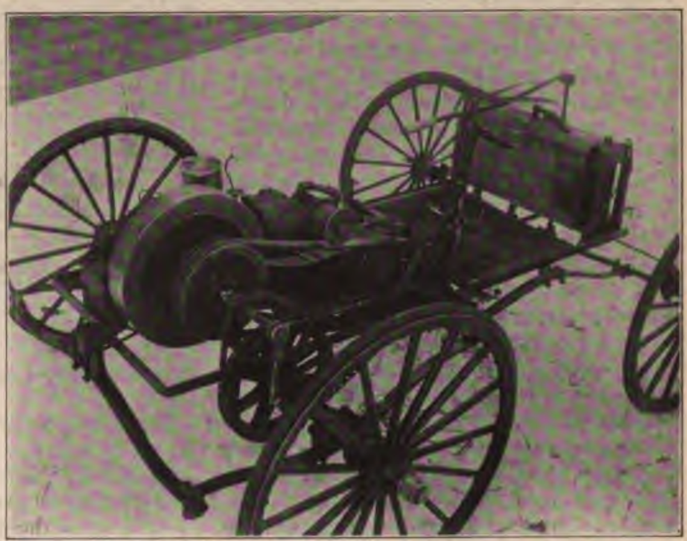
The water cooler differs from most other coolers, consisting simply of eighty three-quarter inch brass tubes 8 inches long set on end, with each end opening into a header. Three gallons of water is all it will hold. It has forced circulation (no pump being used), a feature that I do not desire to disclose at present.

I have run the machine 50 miles at a time; one time especially I went up and down twelve large hills. It only took three pints of water to fill the cooler and most of that ran out, as you can readily see that when going down hill the water in the engine is higher than the cooler, but I can easily remedy that little fault. The machine was never towed home yet by a hay motor. It always comes home as fast as it goes away, but they say, "Oh, yes! you made it; you understand it." Yes, but everybody that owns an automobile should understand his machine.

It would fill a book if I were to relate the fun I have had with people on the road with horses. If you want to know who your friends are, just drive an automobile.

D. A. MAXWELL.

MAXWELL'S GASOLINE CARRIAGE.



MAXWELL'S CHASIS.

Another Early Steamer.

Editor HORSELESS AGE:

While riding around in a twentieth century carriage, running as smoothly as clockwork and capable of making 20 miles an hour for hours, I have been thinking of the wonderful progress made by automobile builders in the last few years. An inspection of an old carriage, built in the city of Beverly, Mass., in 1887, brought the subject forcibly to my mind. Of course, I know, as well as many other automobilists, that the horseless carriages were thought of 'way back in the eighteenth century, though I believe few knew that a Danvers, Mass., man experimented with

An 1887 Steam Carriage.

such a carriage in 1786. But I thought when I saw this Beverly carriage that it was one of the first steam carriages made.

It looked to me like a small steam fire engine on a tricycle. The steam boiler was a big cylinder that took up most of the carriage, but the steam dome was not big enough to hold the necessary steam to keep the carriage going for a long ride. Steam was generated from oil, the burners being of the Shipman atomizer style. Power was transmitted from the engine to the rear axle by a chain, and a patented gear allowed for the turning of corners and backing. The carriage had three wheels, like bicycle wheels, with hard rubber tires. The boiler generated 250 pounds of steam, so the carriage was a powerful one. Its speed was never taken. The carriage was exhibited for some time in the opera house.

The chauffeur sat on a single seat in the rear of the boiler. The throttle and the steering lever were close to his hand. The exhaust pipe stuck up behind his back, and the oil and water tanks were beneath his feet. This carriage was built by J. Elmer Woods, of Beverly, and Andrew J. Philbrick, of Salem, two bicycle makers, during their spare hours. They had a hard job, but I guess no worse than does a beginner with an automobile. The carriage incorporated a number of good ideas, but, like many other good things, it was ahead of its day and it was discarded and went to pieces waiting for its day to come.

After looking at the queer vehicle, I must give credit to the automobile makers for the progress they have made in carriage building, even though I do kick when my cariage balks.

Charles S. Dennis.

An Answer to Mr. Jessup's Ignition Puzzle.

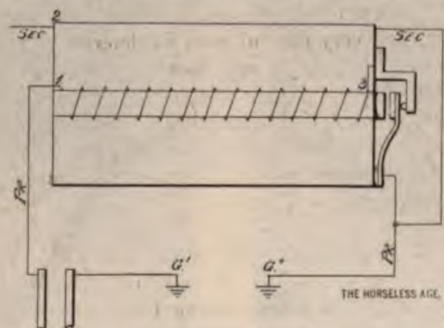
Toledo, Ohio, February 9.

Editor Horseless Age:

Referring to the communication of Mr. Jessup regarding trouble with spark coil, in issue of February 4, would say that this furnishes an interesting example of the numerous ways the electrical apparatus can go wrong. Mr. Jessup did not state which terminal was grounded on the core of the coil.

Referring to the diagram, the difficulty can be explained by assuming that the ground occurs at any one of three different points. If the coil has a vibrator and the ground occurs at the point marked 3, and, after the first break in the current at the vibrator, the vibrating arm, on its inward stroke, should strike the core C, a circuit would be made from the core through the arm to the ground G", thus holding the vibrating arm against the core. The result would be only one spark, instead of a succession of sparks, and, as it is probable that the spark would be considerably retarded in starting, it would be quite likely that the one spark would operate the motor satisfactorily after it was once in motion, but would start the engine with difficulty.

Another and more probable explanation, which would apply whether the coil had a vibrator or not, would be that the primary grounded on the core at 1, but grounded in such a way that the vibrations of the carriage after the motor started would shake the wire, so that the ground would be interrupted with every vibration of the vehicle. With each interruption of the ground the conditions would be normal, and a good spark would therefore be formed when the carriage was in operation, while either a very poor one or none at all would be formed at starting. In this case it is assumed that there is another contact between the core and either the primary or secondary, leading to the ground



on the engine, which was not discovered by Mr. Jessup.

A third explanation would be that the secondary came in contact with the core at the terminal 2, and, assuming that it made a very poor contact with the core, it is probable that while the engine was being started the current in the secondary jumped to the core, through the poor contact, then jumped from the core to the vibrator and from there to the engine, without passing through the plug. When the engine was not in operation the vibrations would break the contact with the core, allowing the secondary current to pass through the plug as usual. If there was no vibrator on the coil this explanation would only hold good in case there was another short circuit between either the primary or secondary and the core. This explains the difficulty in case any of three terminals came in contact with the core, and it is easy to imagine a condition whereby the fourth would bring about the same results, i. e., failu make a good spark, until the motor full operation.

H. P. Do

[Unless we are very much mistake Jessup uses a make and break spark our explanation was that the coil w tirely cut out by the ground and tha the rapid break in normal operatic circuit had enough self induction to duce a hot enough spark without th but that with the slow break at star possibly a somewhat poorer contac spark produced with the coil cut circuit was insufficiently hot to igni charge.—Ed.]

Drawing a Sleigh by Autom

Editor Horseless Age:

I have noticed a good deal of c versy in your paper as to the ability automobile to run in winter. I am ing you under separate cover two of an automobile sleighing rig that fixed up this winter. It consisted of dinary cutter sleigh fastened on behi gasoline carriage, and we had a s behind the motor car that made th carry four and the sleigh carry two, see that we had rather a heavy load car supposed to carry only two. Th picture was made with the extra s and no one in the sleigh or auto, b small picture was made showing th aboard.

E. E. Pea

American Automobiles in M

United States Consul John H. writes from Valletta as follows:

I have recently received appli from parties here for information w gard to the advantages of the An automobile. There are already sev use, and correspondence is now beir ried on between probable purchase American makers. One gentlem cently went to England, and, after l at the various makes of machines ordered one of American origin, w giving good satisfaction. This mac of the steam variety, being the on of its kind here. The others are op by gasoline. One firm desires to large vans for delivery of goods. N is found with gasoline machines that it is somewhat difficult at tir procure gasoline, on account of loca It is imported from New York and places, but the supply is apt to be lir

American manufacturers of autor should bear in mind that Malta do possess, as a rule, long, level stret road. There are many steep hills- of them having a grade of 1 in 9 machine should be much more p than is the rule in the United State other thing to be remembered is t giving price the manufacturer mus f. o. b. New York; otherwise, the i will not know what his machine is to cost him. People here know

about distances or freight rates between ports of shipment and our interior cities. Several negotiations have failed because the dealer in the United States insisted upon quoting prices f. o. b. Chicago or other place of export. When possible, it is even better to give prices c. i. f. Malta. In other words, when the buyer at Malta writes for terms, he should be given information which will enable him to figure exactly what the machine will cost him, landed here. If information as to the cubic measurement of the machine as crated or boxed for shipment can be given, it will add to the satisfaction of the buyer. Some time ago an American carriage manufactured in one of our interior cities was sold here, and, to my own knowledge, one of the greatest points considered was the completeness of the information given in the catalogue. I provided other catalogues, which were prepared in attractive style and showed desirable goods, but information as to terms, etc., was very meagre and they were not considered. It must be remembered that transportation from New York to Malta is now ample by way of a direct line of steamers. My assortment of automobile catalogues is somewhat limited, and I should be pleased to receive such as manufacturers may see fit to send me.

Electric Automobiles.

A lecture was recently delivered by Henry F. Joel before the Institution of Civil Engineers, London, on the above subject.

The author stated that in London alone there were over 16,000 licensed horse carriages, apart from private vehicles, tradesmen's vans, &c., and it is estimated that over 200,000 horses were stabled each night in London, necessitating the daily removal of more than 5,000 tons of manure and refuse, in addition to what was distributed over the roads, and found its way into the residences of the people. The growth of London and other large cities made the problem of substituting motor cars for horse traction one of the first importance, and the object of the paper was to describe one form, possibly the most practical, and certainly the most interesting of all forms of motor car, the electric automobile. These had now become thoroughly practical vehicles, journeys of over 100 miles on one charge, and tours of over 1,000 miles (from London to Glasgow and back) having been satisfactorily accomplished. Electrical energy was power in an economical and readily applied form, the application of which gave rise to no noise or smell, made no refuse, and was convenient. It also afforded facilities for braking power and recuperation of energy which were not obtained with other sources of energy. The earlier experiences with various types of cars, &c., were first described, the information being tabulated as far as possible, the historical side of the subject being briefly dwelt upon. It was only since the passing of the Locomotives on Highways Act, 1896, that the problem of motor cars has been seriously attacked in England. In Germany, France, Austria, America, Italy, Spain, Belgium and many other countries earnest attention was being given to the manufacture and the perfection of electric vehicles, and in most of these countries inventors and designers were assisted by their governments directly by subsidies, by official trials, as in Berlin, or otherwise. In England it had been left entirely to the enterprise of the private individual to compete with the foreigner for a share at least in this new and important industry, which even now gave employment to some 10,000 men. Tabulated examples of recent long distance runs of carriages on one charge were given, and these records were analyzed for comparison, elevations and plans of the carriages being shown to scale, and the disposition of the batteries indicated. As these were all special designs and not merely adaptations of carriages, they were instructive as examples. The author then considered briefly, in turn, the leading points in connection with the various parts of an electric automobile—namely, the storage batteries or accumulators, motors and gearing controllers and circuits; under frames, types of vehicles, design and construction of carriage and proportion of power to load; as well as the comparative costs of electric and other motor cars.

Some very careful tests to determine the durability of storage batteries had been made by the Automobile Club of France in 1889, extending over six months, the results of which were given in the paper. The tests had been made under conditions analogous to those that would occur in the carriages in practical use. The sets of batteries had been equally charged with 24 amperes at 2-5 volts per cell, but had been discharged at rates varying from 20 to 100 amperes, with intermediate periods of rest, and while being discharged they had been subjected to artificial vibrations, to give the effect of road vibrations, and this treatment had been continued until the cells had shown signs of failure.

The ratio weight of vehicle to weight of storage battery was next considered. Generally speaking, as the ratio of the battery to the vehicle increased, so the distance the vehicle could be run on one charge was increased. But of greater importance, from a practical point of view, was the load carrying capacity, and ratio of the weight of useful load to the weight of the battery and vehicle. A battery of accumulators weighing 6 hundredweight would give 10 horse power hours, or 67.2 pounds weight of battery for 1 horse power hour, taking the efficiency of the motor and gear at 75 per cent. Assuming an output of 15 watt hours for 1 pound of complete battery, such a battery would convey itself against a tractive resistance of 50 pounds per ton (or 1-45), at the rate of 12 miles per hour, for a total distance of 250 miles. If the vehicle to convey this battery weighed 6 hundredweight, the distance that could be run with vehicle and battery would be 125 miles; and with a load of 3 hundredweight (driver and passenger) the distance would, under the same conditions, be reduced to 100 miles, equal to 75 ton miles. With twice the load, or 6 hundredweight, the distance of the run would be reduced to 83.8 miles, but the ton mileage would be the same; and with three times the load—namely, 9 hundredweight—the distance would be still further reduced to 71.4, also equal to 75 ton miles. The cost of carrying the useful load would be: For the 3 hundredweight load, at the rate of 1.8d. per ton mile; for the 6 hundredweight load, 1.1d. per ton mile; and for the 9 hundredweight load, 0.9d. per ton mile. The conclusion would be that, as the load was increased, the cost of conveying the useful load per ton mile was reduced; this was so, but the limit was soon reached when the vehicle must be made stronger and heavier to carry the increased load, and the running cost of the whole would be increased, as well as the first cost and the consequent allowance for depreciation and interest. Curves were given in the paper showing the ton mileage, in conjunction with the ratio of weight of battery to the total weight; the ratio of useful load to the total weight, the cost of electric energy per ton mile of useful load, the cost of electric energy for running the car and battery without load, and also the relative weights and costs of cars. In America batteries were made which gave a very great output with a comparatively shortened life of the positive plates, and as these batteries were of comparatively small cost they could be entirely renewed, say, each year, and this had been stated to result in economy. The author considered that potentialities of electric propulsion of carriages on common roads were very great. England had been late in taking up the the motor car, and France, America, Germany and other countries were far ahead, but it was to be hoped that England would now take its place in the world with this new industry, as it had done in the past with the steam locomotive.

The Detroit Show.

The Tri-State Automobile and Sportsmen's Show opened at the Light Guards Armory, Detroit, on February 9, and continued for the week. Quite a number of vehicles arrived late, and work on some of the stands continued all day Monday. The list of exhibitors at the show was as follows:

W. E. Metzger, representing the Cadillac, Winton, Toledo, Peerless, Waverley, Baker and Columbia cars; the Oldsmobile Company, of Detroit, showing the Olds line of gasoline machines; J. P. Schneider, representing the Northern, National, Elmore and Parr cars; White Sew-

ing Machine Company, of Detroit, exhibiting the White steam touring car; Kirk Manufacturing Company, of Toledo; W. H. Weber, Detroit, representing the Searchmont, Conrad, Orient and Rambler; Flint Automobile Company, of Flint, Mich., showing the Flint roadster; Wheeler Manufacturing Company, Detroit, showing a car of their own manufacture; Jackson Automobile Company, of Jackson, Mich.; F. P. Illsley, of Chicago, showing several Autocar models; Sandusky Automobile Company, of Sandusky, Ohio; Ide-Sprung-Huber Company, showing a delivery wagon built by them for a local newspaper, and Tom Cooper, showing his big racer.

The Marr automobile, which was exhibited for the first time, is a very attractive two passenger car, with a single cylinder, horizontal, 6 horse power, four cyle engine. The machine weighs 1,000 pounds and is of reachless construction and

The water capacity is 3½ gallons; gasoline, 9 gallons, sufficient to run the car 350 miles, it is stated. The machine is manufactured in Detroit by the W. L. Marr Auto Car Company, the company being composed of J. H. Brown, J. P. Schneider and W. L. Marr.

The Wheeler Manufacturing Company exhibited the Detroit touring car. The machine is of 9 brake horse power and has a single cylinder horizontal engine. The carburetor is of their own design. The machine weighs 1,250 pounds, with an attachable tonneau.

M. Dingfelder & Co. have on exhibition a small runabout, weighing but 450 pounds. The engine is a horizontal, single cylinder, four cycle, high speed engine. The flywheel is very large and very heavy. There is no transmission gear, but the machine is equipped with a reverse, and the engine is so flexible that Mr. Dingfelder states that he finds it capable of traveling

the show from the standpoint of t[l]
mobile exhibitors was hardly a succ
every one was free to admit this.
Mr. Metzger, who was at once e
and president of the show organiz
cern. The growling of the 200 c
dogs and the noise in the shooting
put a hard strain on the nerves of
the attendants who had to be on l
day long, and the opinion was g
voiced that a dog show was not th
place to exhibit automobiles.

Like the Cleveland Show the
Show had its comical feature. T
gram of entertainments included
concert at the armory, but the
were put out of business, so to sp
the dogs.

Trade Literature Receiv

The Butler Patent Drill Chu
Frasse Company, 38 Cortlandt stre
York city.

A View of the Detroit Automobile Show.

mounted on four semi-elliptic springs. One of the features is a muffler on the intake valve, thus doing away with the disagreeable sound of air suction so noticeable on many machines. The carburetor is of the float feed type of their own design. The machine is equipped with a single lever, which controls two speeds forward and reverse, together with the emergency brake. The speed of the engine is controlled by a throttle and the spark advanced automatically. One of the attractive features of this machine is the adjustable steering column, it being made so that the wheel will stand directly upright to allow passengers to enter the car, when it may be drawn back to suit the convenience of the driver. The machine has all lubrication in sight. The cups for the lubricating dope are placed on the outside, just below the right hand, and out of sight. The cylinder oil cup is on the dashboard.

from 4 to 20 miles per hour without the use of transmission gear. A single lever controls the machine. It is equipped with a tiller for steering, the wheels are of wire, and the body, while it is small, accommodates two persons very comfortably.

Parts and sundries were exhibited by the following: B. F. Goodrich Company, Akron (tires); Diamond Rubber Company, Akron (tires); Fisk Rubber Company, Detroit Branch (tires); Twentieth Century Manufacturing Company, New York (lamps); Hussey Auto and Supply Company, Detroit (steering wheels, radiators, etc.); Briscoe Manufacturing Company, Detroit (radiators).

The attendance was in the neighborhood of 3,000 each day the first three days, but as the show was essentially a sportsmen's affair, the majority of the visitors had no other interest in automobiles than that prompted by curiosity. To put it mildly,

The Velox Ball Bearing Grin
The Frasse Company, 38 Cortlan
New York city.

Rambler Automobiles.—Thomas
fery & Co., Kenosha, Wis.

Data Concerning Platinum. Et
& Co., 408 New Jersey Railroad
Newark, N. J.

Sparks.—Coil catalogue of E.
liams, 535 Clinton street, Syracus

The Hercules Steel Face Pull
shops).—Federal Manufacturing C
Smith Stampings Factory, Milwau

The Glide Mobile.—The Bart
Company, of Peoria, Ill.

The Welsh Tourist.—Chelsea
turing Company, Limited, Chelsea,

Comments on Whitney Stand
Roller Chains.—Whitney Manu
Company, of Hartford, Conn.

The Union Automobile.—The
Automobile Company, Union City

...OUR... FOREIGN EXCHANGES

The Germain Carburetor.

The carburetor herewith illustrated is to be fitted to all cars turned out from now on by the Germain Automobile Company, the Belgian licensees under Daimler patents.

The apparatus consists of a cylindrical body B B covered by the screw cap A. Within the cylinder B B, and made an easy sliding fit therein, is a piston or plunger C, which is held up in the upper part of the cylinder B B by the coiled spring D D. The suction stroke of the engine piston reduces the pressure within the cylinder B B below that of the surrounding atmosphere, and the latter then takes effect upon the upper surface of the plunger or piston C by means of the orifice A^1 in the cap A. If the pressure of the air on the top of the plunger piston C is sufficient to compress the spring D, the piston is thereby lowered until the triangular orifice E in its wall more or less coincides with the square orifice F formed in the side of the cylinder B B, allowing more or less pure air to enter B B in proportion to the increased speed of the engine.

The number, form and dimensions of these orifices, as well as the strength of the spring, are determined by careful experiments, and regulated once and for all so that at low speed no portion of the orifices coincide, and the carburation of the air is controlled and varied only by the size of the gasoline jet and the usual hand controlled air admission.

On the other hand, when the engine is running at high speed the piston C descends more or less, admitting air through the apertures E and F, coinciding in quantities carefully calculated to give the best possible mixture at every speed. It will be realized that this apparatus will produce the best results with engines which are governed either on the exhaust or by throttled induction.

A report of the trials of the above apparatus in conjunction with a four cylinder 15 horse power motor of 95 millimetres bore and 130 millimetres stroke gives the following results.

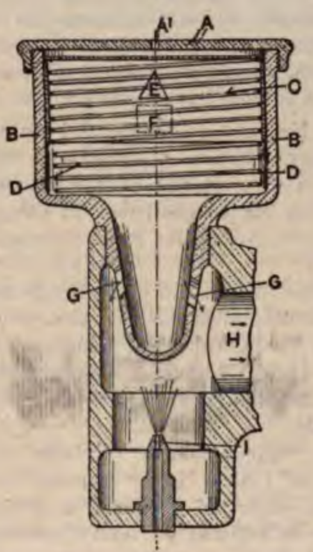
The engine was fitted with induction valves, which were easily transformable from automatic to mechanical operation without in any way altering the proportions of the engine. The ignition was by high tension current. Each experiment was repeated four times, each result given being the mean of the four experiments.

At 970 revolutions per minute the engine, with mechanicaly operated inlet valves, developed 16.85 horse power, the brake arm lifting a weight of 12.5 kilogs., and at 214 revolutions per minute the brake arm lifted 11.5 kilogs. With automatic valves the brake pull was the same at 1,010 revolutions per minute and 270 revolutions per minute—12.5 kilogs.

The above tests show the engine to have exerted more force in both cases when the automatic valves were in use, but point to the fact that the employment of the mechanically operated valves permitted slower running of the engine. From these figures it is argued that the advantage obtained by the employment of mechanically operated valves is so small as not to warrant the additional complication necessary for their actuation.

The special apparatus in conjunction with the automatic valves permitted the reduction of the speed of the motor to an extraordinary degree while preserving the same efficiency at the rim of the flywheel.

From the above experiments, in conjunction with this carbureting device, the designers thereof argue that when it is desired to vary the speed of a combustion engine between extremes it is not alone sufficient to advance or retard the ignition, but that it is necessary in addition to vary the rapidity of the combustion of the explosive mixture in accordance with, or in proportion to, the desired speed of the motor. At high speeds the combustion should be as rapid and as instant as possible, while at low speeds the speed of the combustion should be decreased in order to permit as smooth a motion as may be. It should be clearly understood that the tests referred to were made by the makers, and it is on the assumption that their figures are correct that our criticisms are based.—*The Autocar.*



Germain Carburetor.

The Proposed 1,000 Mile Trials of the A. C. G. B. and I

As recently announced, the Automobile Club of Great Britain and Ireland has definitely decided to hold during the coming fall an important trial of automobiles approximating 1,000 miles in length. The daily runs will start from a central point, the Crystal Palace, near London, the same as last year. It is now recommended to award marks in these trials as follows:

Marks shall be given for "accuracy of advertised horse power," which is to be taken from the best performance of the car on any one hill.

Three marks per mile are to be awarded for each day's run as reliability marks; deduct one mark per minute for stoppages as before; 1,500 marks allotted for "cleaning, adjustment and replenishing," deducting one mark per minute as usual, to apply to Crystal Palace deductions only.

Marks:

3,000 for reliability.
1,500 " cleaning, etc.
1,500 " hill climbing.
500 " condition.
250 " brakes.
250 " steering.
250 " silence.
250 " vibration.
500 " speed.
250 " dust.
250 " restarting on hill.
250 " vapor or smoke.
250 " appearance.
250 " accuracy of horse power.
250 " fuel consumption.

Fuel consumption marks to be:

For 30 miles per gallon for car weighing one ton laden.
For 10 miles per gallon for car weighing one ton laden.
For 45 miles per gallon for car weighing half ton laden.
For 15 miles per gallon for car weighing half ton laden.
For price deduct from the grand total one mark for every £1 sterling above the minimum of the class at which the car is entered.

Hill climbing formula

$$= \frac{S \times (P + 6)}{(£ + 2000)} \times \frac{A \times C}{N}$$

S = speed in miles per hour on hills; P = number of passengers carried; £ = price in pounds; N = the number of hills on which trials are held; A = the average gradient in percentage; C is a constant.

Formula for speed:

$$\frac{S \times (P + 6)}{(£ + 2000)} \times 3000.$$

The mechanics of the Société Mors, of Paris, have gone out on strike owing to a disagreement with one of the foremen, whose dismissal they demand as a condition of resuming work. The firm repudiate the right of the men to dictate to them, and the result is a deadlock.

The report and awards of the judges have now been published by the Automobile Club of Great Britain and Ireland relative to the 4,000 mile trials of motor car tires which took place last summer, and the first prize of £100 is awarded to the Dunlop tires on car No. 72.

MINOR MENTION

Reed & Underhill, at 41 Stanhope street, have the Boston agency of the Knox automobile.

Action on the proposed Chicgo automobile ordinance has been deferred until after the Show.

Prescott Warner has been re-elected president of the Stanley Automobile Company, Lewiston, Me.

Councillor Lundy has introduced a by-law in the Toronto, Ont., Council to regulate the speed of automobiles.

The property of the Taunton (Mass.) Automobile Company has been sold to New Bedford parties for $2,050.

The El Paso Good Roads Association is agitating the construction of a boulevard 150 miles long from Denver to the Royal Gorge.

A company is reported to have been formed at North Attleboro, Mass., to manufacture gasoline automobiles in Plainville, same State.

Robert W. Slusser, New York, has been appointed general sales manager of the Fredonia Manufacturing Company, Youngstown, Ohio.

The National Automobile Company will remove from Oshkosh to Milwaukee, Wis., where they will occupy the building at 181 and 183 Second street.

The Automobile Station, Chicago, has been incorporated by George N. Lyman, George D. Bardon and Raymond Collins. The capital is $5,000.

Jerome Pomeroy, Springfield, Mass., on February 6 was awarded a verdict of $225 against Samuel T. Ball for damages caused by defendant's automobile.

Plans are being drawn for an addition to the factory of the Matheson Motor Car Company, Grand Rapids, Mich. It will be 28x45 feet, and one story high.

The Pasadena (Cal.) Garage Company has been incorporated by Ellicott Evans, Robert H. Gaylord, A. Kingsley Macomber, H. T. Kendall and H. J. Macomber.

M. M. Drake, F. P. Conrad, G. W. Atterbury, E. B. Olmstead and W. E. Pengat have been elected directors of the Conrad Motor Carriage Company, Buffalo, N. Y.

The Beaumont Cycle and Auto Company, of Beaumont, Mo., has been incorporated; capital stock, $10,000. Incorporators, F. L. Rollins, H. B. Ford and J. S. Rollins.

The town of Nahant, Mass., has been petitioned by Frank Garland and James P. Calman for the right to run a line of automobile wagonettes between Nahant and Lynn.

Charles M. Houghton, Amherst, Mass., whose automobile was wrecked last summer in Orange by an alleged defect in the highway, has sued the town for $1,000 damages.

Police Magistrate Zeller, New York, discharged with a warning Benjamin P. Barry, a New York automobile dealer, who had been arrested for violation of the automobile speed ordinance.

The case of Cord Meyer, Great Neck, N. Y., in appeal from a conviction of having violated the Cocks automobile speed law, was argued at Mineola on February 8. The judge reserved decision.

On Lincoln's Birthday the Long Island Automobile Club, Brooklyn, N. Y., made a run of 72 miles on the North Shore roads of the island, dining at Holly Inn and returning home by moonlight.

The Hoffman Automobile Company, of Cleveland, and the Neftel Automobile Company, of New York, have been elected active members of the National Association of Automobile Manufacturers.

Owing to the alleged inability of the automobile dealers of Indianapolis, Ind., to get together to hold a show the Fisher Automobile Company will have a show at their new building during the first week in April.

The Nelson Gas Engine and Automobile Company, Harlan, Ia., has been incorporated, with a capital of $50,000, and the following named gentlemen as officers: T. K. Nelson, president; S. G. Dummon, secretary.

Detroit, Mich., will undoubtedly produce more automobiles this year than any other city in the world. The combined output of the Olds, Cadillac, Northern, Ford and other factories is estimated at over 10,000 annually.

The reappraisement division of the Board of United States General Appraisers has sustained advances made by Appraiser Whitehead on several automobiles from A. Clement, Lavallois, France. The total advances approximated $531.

Notice has been given of the dissolution of the copartnership existing between Geo. G. Reed, Arthur P. Underhill and Perl C. Lewis, under the firm name of Automobile Headquarters, Boston, Mass. Orpha O. Lewis, administratrix, is authorized to settle the firm's affairs.

Miley B. Raymond, who is said to have been responsible for the collision of his automobile with a trolley car, by which several persons were recently injured in Yonkers, was held in $500 bail in the Harlem Police Court, New York, for violation of the automobile speed law.

In reference to the description of the Eisemann igniter in a recent issue, Alfred Vischer & Co. inform us that they have two distinct machines for single cylinder motors, one for carriage motors and the other for bicycle motors, the latter being much smaller than the former.

Ralph L. Morgan, of Worcester, Mass., gave a lecture on "Motor Trucks" at the February meeting of the American Society of Mechanical Engineers, held in New York city on February 3. A representative of the Street Cleaning Department of New York city was present and gave the opinion that valuable could be rendered by motor trucks line of work.

The People's Auto Transit Co[illegible] Vermilion, Ohio, has been incorp[illegible] with a capital stock of $25,000. T[illegible] corporators, who are residents of [illegible] Huron and Erie counties, are F. B. [illegible]more, S. E. Miller, Milo Moulton, [illegible] Brown, E. T. Prentice, R. Wortm[illegible] R. F. Quigley.

The Phelps Motor Vehicle Co[illegible] Stoneham, Mass., organized with a [illegible] of $300,000, has succeeded the Phel[illegible]tor Company, and will hereafter carry business of manufacturing motor v[illegible] under the patents and designs of Phelps and others. The officers are: [illegible]dent, Elliot C. Lee, Brookline, Mass.; [illegible]urer, A. T. Harris, Boston, and genera[illegible]ager, L. J. Phelps, Melrose Highland[illegible] treasurer's office is temporarily at 2[illegible] street, Boston.

The building being erected for th[illegible]ton Motor Carriage Company at B[illegible] and Stanhope streets, Boston, Mas[illegible] have on the first floor a salesroom capacity for eight machines, the offic[illegible] and a ladies' retiring room. A [illegible] feature will be the separate entran[illegible] automobiles, the machine going [illegible] onto the elevator, which lowers it basement. On this floor a complete shop will be maintained and back will be found a wash room and a with a capacity of 100 boarders. A new feature will be the special fire There will also be a man who will to repairs at any hour of the night salesroom was opened to the public o[illegible]ruary 16.

It is reported that the situation i[illegible]ton grows more and more strained time draws near for the opening rival show and that it is generally co[illegible] that the show to be given by the Ne[illegible]land Automobile Association is pu[illegible] spite affair against the Boston dealer[illegible] cause the Boston dealers wanted to how their interests would be prote[illegible] the Legislature by the Automobile before they put money into the ha[illegible] the club's committee, is said to have the whole affair. The dealers were and desirous of working together w[illegible] club, but were unable to get any sa[illegible]tion from them and were obliged th[illegible] to protect themselves by presenting own bill. What the outcome will hard to say, as no one seems to have clear idea of who the exhibitors w[illegible] All the space for the dealers' show in[illegible]phony Hall is said to have been sold.

Wouldn't That Jar You

"Doesn't it give you a terrible [illegible] when you run over a man?" they [illegible] him.

"Yes, if he's a large man," repli[illegible] automobilist. "It gives me a pretty jolt sometimes."

MOTOR VEHICLE PATENTS..

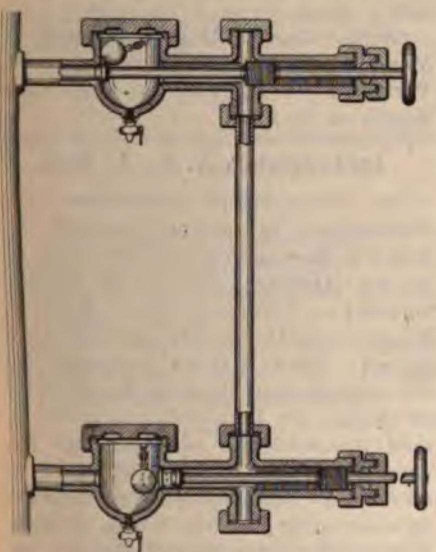
United States Patents.

719,855. Stroke Varying Mechanism for Explosive Engines.—Albert F. Parks, of Brooklyn, N. Y. February 3, 1903. Filed January 23, 1902.

In an explosive engine, the combination with a pair of cylinders, and with a pair of variable stroke pistons movable therein, of a pair of connected cranks, a pair of differential connected eccentrics shiftable on said cranks, and connections between said eccentrics and said pistons.

719,842. Water Gauge.—John McCormick, of Wilmerding, Pa., February 3, 1902. Filed May 15, 1902.

As heretofore constructed the steam and water cocks between which the glass tube is



No. 719,842.

arranged have been connected to the boiler by hollow extensions or inducts within which the balls have been placed and allowed to roll freely between their seats at the end of the extensions connected to the cock and a stop arranged at the end of the extension adjacent the boiler. The stems of the cocks have been seated against the ends of the hollow extensions opening into the casings of the cocks—that is, beneath the glass—and the blow off cock has been located at the bottom of such casing. Practice had demonstrated numerous defects and inconveniences in water gauges as thus constructed. Sediment collects in the hollow extensions and retards the movement of the balls, frequently resulting in their becoming clogged at one end or the other of the passage. It being a generally recognized fact that when the boiler is in operation and the glass intact the balls will not interfere with the passage of the steam and water, attendants have been led to rely upon the gauge implicitly as indicating the exact level of the water in the boiler. It has been found that such indication is not always correct and serious results have followed, due to the fact that the sediment in the hollow extensions has clogged the balls against the outlet.

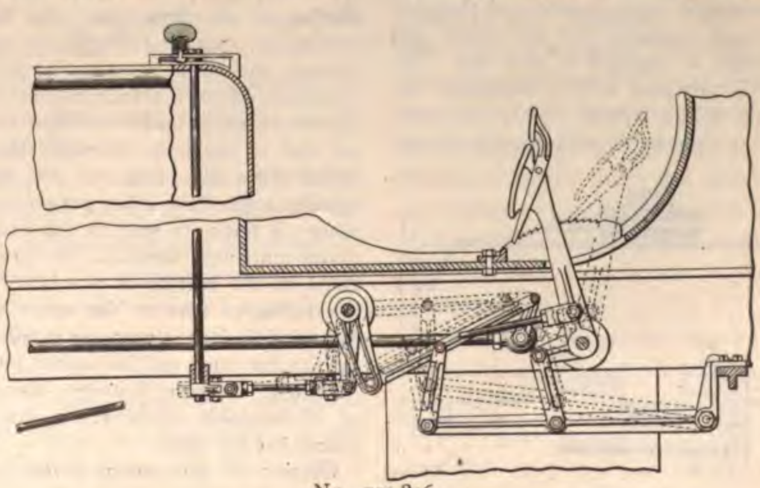
When it has been desired to employ the blow-off valve, the opening of the same has caused the balls to seat themselves just as they are designed to do when the glass breaks, not only precluding the possibility of blowing off sufficiently, but leaving the sediment around the balls at it was before.

The object of this invention is to overcome these difficulties, and to this end the gauge is constructed, as shown, comprising the combination with the steam and water cocks, a gauge glass connecting these cocks, hollow extensions connecting the glass to the boiler, and valves having their stems extending through the cocks and into the extensions, of chambers intermediate the ends of the extensions having inlet and outlet ports, said valves being designed to close the inlet ports, and balls suspended within the chambers and designed to close the outlet ports.

719,806. Controlling Means for Motor Vehicles.—D. E. Johnson, of Hartford, Conn. February 3, 1903. Filed April 11, 1902.

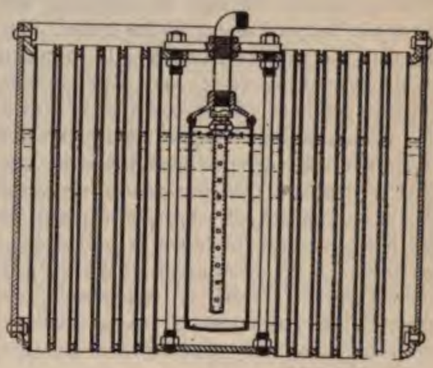
This invention aims to provide means for controlling the vehicle brake and the motive power regulating means from one and the same controlling member or means whereby application of the brake is always accompanied with reduction of applied motive power, and, vice versa, release of the brake is accompanied with increase of applied motive power. This controlling means may conveniently be a foot operated lever, such as the usual brake lever, which may thus be employed for the entire control of the starting, stopping, and speed of the vehicle.

The brake is applied by means of the usual foot pedal provided with a ratchet locking device. Directly behind the pivot shaft of the brake pedal is located the throttle valve, by means of which the admission of steam to the engine is regulated. This throttle valve is opened and closed by a rotary or rocking motion of its stem. The stem is provided with a lever arm and can be rocked around its axis in either of two ways—by depressing the brake pedal or by rotating the throttle valve crank rising through the seat. When the brake pedal is depressed the end of the link connected to the lever on the valve stem is displaced in a cam slot, which closes the throttle. Normally the end of this link reposes in the lowest part of this slot and the throttle can then be closed by means of the crank lever directly.



No. 719,806.

719,670. Steam Boiler.—Henry A. House, of Hempstead, England. February 3, 1903. Filed February 25, 1902.



No. 719,670.

One part of this invention relates to improved means for effecting the deposit of the lime and other salts contained in the feed water in such a manner that they shall be prevented from depositing on parts of the boiler where they would form a hard scale.

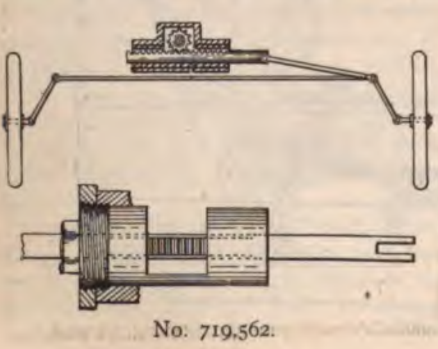
A depositing vessel in the form of a hollow vertical cylinder is placed centrally in the boiler. The feed pipe extends down to a considerable distance inside the depositing vessel and is provided with holes at its sides, through which holes the feed water is delivered into the depositing vessel. Openings are left at the upper part of the depositing vessel, which allow free communication between the interior thereof and the main body of the water in the boiler, so that the same pressure pervades both. The depositing vessel is made of thin metal

having a high coefficient of expansion under the action of heat—such as copper, for example.

It will now be understood that the depositing vessel and the water contained in it will take up heat rapidly from the surrounding boiler water in which the vessel is immersed and that when feed water is pumped into the depositing vessel it will be rapidly heated while still isolated from the main body of boiler water. This heating of the feed water causes more or less of the lime to separate from it and to fall to the bottom of the depositing vessel, leaving the thereby softened water free to rise to the upper part thereof, where it overflows or passes through the openings into the main body of water in the boiler. The deposits are thus retained wholly or partly in the depositing vessel and little or none get into the body of the boiler to be deposited upon the hot surfaces. When the lime and other salts deposit upon the inner surface of the walls of the depositing vessel they are cracked off therefrom when the fire is let out and the boiler is cooled down by reason of the contraction of the material of which the vessel is constructed, the greater the coefficient of expansion and contraction of the material the better it will be for this purpose.

When it is desired to clean out the depositing vessel, it may be removed bodily from the boiler through a suitably arranged hand hole, through the cover of which the feed water inlet pipe may be led, as shown.

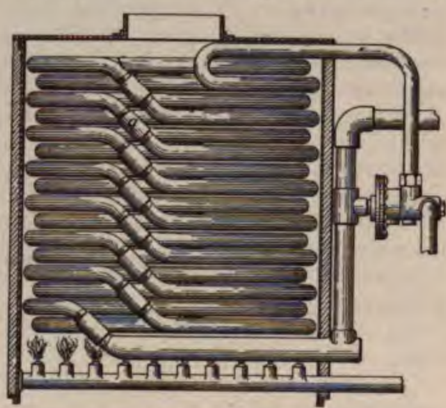
719,562. Steering Gear for Automobiles. —A. P. Brush, of Detroit, Mich. February 3, 1903. Filed November 21, 1902. The steering shaft is provided at its lower end with a pinion, and with this pinion meshes a rack bar made out of a round rod and connected up with other features of the automobile in the customary manner. To prevent any backlash between the pinion and the rack bar is more specifically the purpose of this invention, which is secured by providing a frame fitted with an eccentric bushing, through which the rack bar reciprocates. This bushing is cut away intermediate its ends, to allow its being turned about through a limited arc without interfering with the pinion. The bushing is provided with an enlarged threaded end or head, engaged with the frame, and upon which is engaged a lock nut. The bushing is provided with a hexagonal extremity by which it may readily be turned within the frame. It will readily be apparent that if any backlash occurs between the pinion and the rack bar it can readily be overcome and prevented by simply turning the eccentric bushing within the frame as required, so as to tighten the position of the rack bar relative to the pinion.



No. 719,562.

719,420. Steam Boiler.—Robert W. Barton, of Chicago, Ill. February 3, 1903. Filed October 16, 1902.

The invention relates to a flash boiler. The boiler employs water tubes which are coiled in circular spirals, the coils being disposed in flat layers. The boiler is composed of units of these coils, each unit comprising a pair of coils, the lowermost of which is in more direct connection with the source of feed water supply, while the up-



No. 719,420.

permost of which is in more direct connection with the engine. These units are assembled in vertical line and are so joined in succession that the top layer of one unit is in connection with the bottom layer of the unit immediately adjacent. In this manner a series of traps are provided which always entail the presence of water within the boiler. The water is supplied to the tubes and travels toward the bottom of the boiler a distance commensurate with the steam that is being consumed. By the device of the invention the action of gravity is only partially effective upon the water within the boiler, it requiring pressure controlled by suitable feed water regulating means to effect the flow of the water. The coils of each unit are so wound that the inlet for the water is located at the outer portion of the lowermost coil, the water finding its passage through the coil as it follows the spiral course thereof toward its centre, where a branch connection is encountered, which leads the water to the upper coil of the unit, the water then circulating from the centre of the upper coil spirally toward the other periphery thereof, where it finds its way to the bottom coil of the unit next beneath. A burner is located at the bottom of the boiler to heat the tubes, so that as the water is forced downwardly by the pressure it will encounter the hot tubes and be flashed into steam.

719,937. Storage Battery.—Bruce Ford, of Philadelphia. February 3, 1903. Filed December 19, 1902.

Objects of the present invention are to provide for holding down the separators which are used between the plates ments and which are buoyant in th trolyte, and therefore tend to rise, a to provide for supporting the co cases where suitable supports are ab

719,993. Friction Clutch.—Malcolm bell, Boston, Mass. February 10, Filed February 24, 1902.

720,126. Speed Regulator for Ex Engines.—Lee A. Frayer, Columbus, February 10, 1903. Filed Novemb 1902.

720,153. Steam Boiler.—George A nedy, Toledo, Ohio. February 10, Filed March 13, 1902.

720,241. Motor Vehicle.—Charl Haase, Jr., Milwaukee, Wis. Febru 1903. Filed December 8, 1902.

720,321. Secondary Battery.—Fra chanan, Dayton, Ohio. February 10 Filed March 18, 1901.

720,343. Compound Expansion Flu gine.—Frank Goodfellow, George G low and Robert Goodfellow, Hyde, land. February 10, 1903. Filed Ju 1902.

720,376. Safety Brake Apparatu Motor Cars.—Charles F. Peel, Jr. York, N. Y. February 10, 1903. September 11, 1902.

Philadelphia A. C. A. Ru

The Pennsylvania Automobile Philadelphia, has extended several tesies to those who participate in t to the "Quaker City" on Washin Birthday. Through their effort doors of the Union League Club open to them; storage accommo for carriages have been arranged f of charge; the Park Department w tend the privileges of Fairmount without the usual permit and num quired in Philadelphia; each ca however, must bear the initials of as required by the New York law. they have also extended to participa courtesies of their own club and ha arranged for a run on the day of on the Lancaster Turnpike to Ar Bryn Mawr and West Chester, 25 Owing to the heavy snow storm, the and Tours Committee on February 17 consultation with those who had in to participate declared the run off.

The Cape Town Council has r passed regulations regarding autom At night motors must have a whit in front and a red light behind; the not exceed 6½ feet in width. The is limited to eight miles an hour congested streets or within the mun ity of Cape Town. The tires must a soft or elastic material, with a s surface. There are to be two ef brakes which will act independentl in the case of cars used for passenge business purposes the name of the or owners and the place of abode m painted in a conspicuous position side of the car.

THE HORSELESS AGE

...EVERY WEDNESDAY...

Devoted to Motor Interests

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THE HORSELESS AGE.

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The Chicago Show.

Chicago is not and cannot be in the near future an automobile centre of the same order as New York, and that an exhibition was organized in the Western metropolis which in number and variety of exhibits equaled the New York Show is certainly strong testimony to the good will of the industry. The exhibitors, of course, looked upon the Show from a business standpoint and expected full returns for their outlay and efforts, but there is little doubt that in this respect many of them were disappointed. The attendance was small all through the week, and as one of our correspondents puts it, "There was no life at the Show." In fact, it has been intimated that permission to show vehicles in motion was granted "to make things a little livelier" and thereby in at least one respect compensate for the small attendance. The cold wave and snowstorm of last week struck Chicago shortly after the opening of the Show, and this may have deterred some of the prospective visitors living at a considerable distance from making the trip.

There were quite a number of new vehicles shown—that is, vehicles by new manufacturers—but most of them seemed to be pretty close copies of some well established model. Originality does not seem to be a marked quality of vehicle builders in the West, at least not originality associated with practicability. Originality devoid of practicability leads to the production of freaks, and these were somewhat in evidence at the Show.

The West is, of course, somewhat behind the East in the matter of automobiles, and the social conditions are also somewhat different there. For these reasons the light and medium weight vehicle is more in demand there than here, and played a greater part at the Show than the touring car. Only two foreign makers were represented and these also were manufacturers of medium weight machines and not the heavy class of vehicle.

This year the public press of Chicago devoted considerable space to the Show, some of the Sunday papers issued on the 15th containing a full page illustrated report and forecast of the event. It was somewhat amusing to read in these reports the monotonous reiteration of the superiority in point of size over the New York Show, and no less amusing the estimates of the value of vehicles that would be sold. However, it is certainly a point in favor of the exhibitors to have the daily papers devote all the space possible to the event.

The Business Vehicle Contest.

As announced in our last issue, the Automobile Club of America, through its special contest committee, has decided that its contest of motor vehicles for goods traffic *will* take place in May next, notwithstanding that the N. A. A. M. has disapproved of such a trial being held this year. As we have already said, we cannot understand what prompted this decision of the N. A. A. M., and that the club is going ahead with the organization of the trial seems to indicate that it also failed to see any reason for this decision.

The success of heavy steam wagons in England has been accelerated to a considerable extent by the yearly trials of the Liverpool Self Propelled Traffic Association, which trials began when the commercial automobile was still in its very infancy over there. That branch of the motor vehicle industry which is engaged in the production of trucks, drays and delivery wagons evidently saw in these trials a factor tending to promote the cause of their business, for they participated in them with very few exceptions.

It cannot be argued that the commercial vehicle is not yet developed to a point where a successful trial can be held. Many of these machines are now in actual use by commercial houses and as soon as a vehicle has reached a stage where it can consist-

[illegible]

[illegible] Weight, up to [illegible] pound.

Among the changes in detail may be mentioned the almost complete adoption of the artillery wheel, and particularly the steel tubular wheel, a great increase in the use of the pump spark and also in the use of generators, especially governed ones with electro magnetic field.

The writer was somewhat disappointed in not seeing more advocates of natural circulation among the exhibitors, as in his opinion all moderate speed water cooled machines will eventually be so equipped. There was one newcomer in this field, however, an old, well established concern that has been all through the pump business. There were at least four firms exhibiting vehicles with natural circulation.

Wheel steering has become almost universal among medium weight and heavy vehicles. The lever is still largely used on the lighter models. Among frames there is a considerable variety, there being a few tubular ones (although not nearly as many as formerly), a good many composite ones of wood and steel and many others of angle [illegible] and various combinations [illegible] and sheet steel forms.

Some Exhibits

[illegible] New York Show.

[illegible]

said to have recently been adopted [illegible] eral manufacturers. There were also [illegible] the complete rear axles of this co[illegible] and the front axles which were re[illegible] described in THE HORSELESS AGE.

THE MIDGLEY MANUFACTURING CO[illegible] exhibited different sizes of their [illegible] steel artillery wheels fitted with di[illegible] styles of bearings and rims for singl[illegible] and detachable tires. These whee[illegible] now made with all standard rims. [illegible] were also on exhibition sectional [illegible] such as spokes, rims and hubs, to [illegible] the public the exact construction of [illegible] wheels, the reinforcements and the [illegible]ough brazing of the different pa[illegible] their special process of complete i[illegible]sion.

THE CLEVELAND-CANTON SPRING CO[illegible] had on exhibition a full line of c[illegible] springs, hand made and oil tempere[illegible] suitable for all styles and sizes of [illegible]mobiles.

THE [illegible] W. JOHNS-MANVILLE COM[illegible] had an exhibition in the Annex [illegible] of samples of their Mobile[illegible] packing, Vulcabeston and piston [illegible] these intended for packing [illegible] engines. The exhibit also [illegible] asbestos fire felt [illegible] and cylinder coverings [illegible] exhaust tubing [illegible] used by [illegible]

[illegible]

...OE MANUFACTURING COMPANY, ... Mich., made an exhibition of ... of radiator called the Pudde... they claim to be a departure ...ing else in this line now on the ...eir chief specialty, a radiating coil ... bent at the returns so as to ...e inner diameter of the tube ..., is also well represented. This ...n does away with cast brass ...eturn bends and allows of the ...s all around the bends. The ... completed by mufflers, tanks ... styles of hoods and fenders, ... own manufacture.

...scoe Manufacturing Company ...erable experience in sheet metal ...to judge by their extensive line ...y have entered the automobile ...ess in earnest. One of the most ...tures in their construction is the ...ployed of preventing road vibra... loosening the rivets with which ...ers are fastened to the irons by ... are supported from the body. ...od consists of using a spring ... the bolt which holds the iron to ... and this gives enough flexibility ...excessive strain on the rivets and ...e time sufficient rigidity to se... the fenders.

...PERIAL WHEEL COMPANY.

... the numerous artillery wheels ...ne made by the Imperial Wheel ... of Flint, Mich., which deserves ... being the only wheel embodying ...struction a short wood hub, the ...rt of the wheel being made up ...mbling it with the metal flanges. The latter are so cast and machined as to receive the wood hub without in any way weakening the construction, and the design combines the advantages of the wood hub with the greater strength of the large flanges, which are held in place by through bolts between every second pair of spokes. The front and rear flanges of one pattern of wheel have a large reinforcement in which the scry seat is made, to bring the drive entirely on the flange, at the centre of the wheel, without excessive strain on the spokes. The front or ball bearing wheel is also very heavily built.

BRECHT AUTOMOBILE COMPANY.

H. F. Borbein, of the Brecht Automobile Company, St. Louis, Mo., exhibited a full size brass model of a reachless angle iron running gear frame with a new radius device from the frame to the spring clips. The frame is equipped with the standard wheel steering device of the company, operating through an enclosed worm and gear segment. The body shown was of the individual single seat type with metal bonnet.

THE CAMMANN MANUFACTURING COMPANY,

of Chicago, Ill., exhibited a sheet aluminum body with satin finish which, they claimed, did not embody a single piece of wood in its construction. The lines of the body are mostly square. It is three seated and has been given the trade name "Jack Frost."

KENNEDY WARREN MANUFACTURING CO.

This company, located at Toledo, Ohio, made an exhibit of their automobile specialties, consisting of the omnimeter and a low water alarm for steam boilers. The omnimeter is an indicating device with three separate dials, showing the time, the distance traveled in miles and the speed in miles per hour at which the vehicle is proceeding. The watch is claimed to be an accurate timepiece and is placed in the case with nothing showing but the dial and stem to wind and set; the odometer is placed in the case, with only the dial showing, and is geared to the stem which drives the speedometer; the speedometer is of the centrifugal governor type with a pivoted lever and tooth sector, the latter meshing with a small pinion, which moves the indicating hand on the dial. The omnimeter is connected directly to a road wheel or some positively geared shaft by means of a flexible driving shaft. An advantage of the device is that it can be placed on the dash where it can conveniently be read by the operator and is protected from dirt and mud, the latter an advantage which is fully appreciated by one who has frequently had to clean the mud from the dials of devices placed at the hub.

GENERAL VIEW OF THE SHOW.

BARTON BOILER COMPANY.

The only boiler of the flash system shown and demonstrated was that of the Barton Boiler Company, of Chicago, which was shown in connection with a Studebaker & Burnell kerosene burner. The construction of this boiler is probably as simple as it is possible to be for a boiler composed of a number of separate parts. A description of the construction of this boiler, with an illustration, appeared in the patent department of our last issue. The manufacturers claim that explosions due to overpressure cannot occur. No thermostat is used, and in consequence the boiler responds quickly

to a demand for an increased supply of steam. The quantity of water in the boiler, it is claimed, depends entirely upon the amount of work demanded and the water never reaches the bottom of the boiler, except in extreme cases. The boiler is intended to work with pressure control of the burner feed and automatic regulation of the feed water.

At this stand were also to be seen the Studebaker pilot light and generator and the Burnell kerosene burner, the main burner of this combination being probably the most novel. It is made of a one piece, soft iron casting, the outside rim of which forms a circular mixing tube, connecting with a mixing tube through the centre. The grid of cross flues receives its gas from the outer rim. The gas jets are drilled at an angle of 60 degrees with the horizontal. This construction, the makers claim, gives a stronger flame and is less liable to back fire than the older forms of burners.

TURNER BRASS WORKS.

The Turner Brass Works, of Chicago, displayed a full line of gasoline double jet blow torches, porcelain furnaces and bracing and tempering forges, and in addition a new carburetor, which they call the new Turner. For this new carburetor some very broad claims are made, it being said to be a positive feeder in all cases except when purposely throttled, to require no priming at starting and to give the same charge regardless of engine speed.

The Kingston carburetor, made by Byrnt, Kingston & Co., of Kokomo, Ind., shows some improvements in this year's model. The gasoline feed nozzle projects to the edge of the air throttling shutter in such a manner that when closed it fits snugly around the end of the nozzle. Thus the closing of the air inlet has a tendency to increase the suction on the gasoline, which is said to prevent any possibility of flooding. The air inlet and needle valve controlling the gasoline supply work together, but are so arranged that either may be set independently of the other.

WESTERFIELD MOTOR COMPANY.

A great variety of motors were shown by many exhibitors, and although the two, three and four cylinder vertical types predominated, a number of interesting features were to be found in some of the opposed horizontal types. Motors of the latter type were exhibited by the Westerfield Motor Company, of Anderson, Ind., a special feature of this motor being the arrangement of the crank and connection rods. The crank is made with three crank pins, the central one being directly opposed to the two outside ones. One of the pistons connects by a single connection rod to the central pin, and the other piston by two connecting rods to the two outside pins. By this means the two pistons are directly opposed and the reciprocating parts perfectly balanced.

The H. L. Hoffmann Motor Company, of Chicago, Ill., exhibited a line of one, two and four cylinder, four cycle motors. These embodied no particularly novel features, the makers claiming to have given their entire attention to careful designing along old, approved lines.

A very large number of exhibits comprise ignition outfits and appliances. Of the many types of dynamos and magnetos exhibited it may be said that each embodies some quality specially adapting it to a given class of work either automobile, marine or stationary. The Motsinger Device Manufacturing Company, of Pendleton, Ind., demonstrated their "auto sparker" in connection with a Trusscott boat outfit, a Sarvent marine motor and a Westfield automobile equipment. There have been only a few slight changes in this machine this year, and these relate to the governor. The novelty at this stand was a machine built under the Motsinger patents in France. It was entirely enclosed in a square casting and used a 5 inch round belt pulley and no governed friction wheel.

The Dayton Electrical Manufacturing Company were showing a dash arranged with a four cylinder King automatic spark timing device, in conjunction with one of their Type B dynamos. With this outfit only a single spark coil is used for the four cylinders and the automatic timer advances the spark in each of the cylinders equally. When the engine is stopped, the spring attached to the governor returns the contact so as to produce a spark when the engine is in the dead centre, thereby preventing all danger of a "back kick" when the engine is again started. The company are making a specialty of a miniature magneto for motor cycles, this machine weighing only 8 pounds and having an output of 30 watts at 1,400 revolutions per minute.

A new ignition dynamo was exhibited by the Miller-Knoblock Electric Manufacturing Company, of South Bend, Ind., and their method of demonstrating the difference in speed between the armature and governor pulley of their "quick action" machine was quite novel. Two disks were employed, one belted to the pulley and the other to the end of the armature shaft, and the painted disks showed the same relative speed for any speed the driver was run up to, indicating perfect action within the governor case. This company is also introducing a line of coils, plugs and magnetos.

The Induction Coil Company, of Milwaukee, Wis., made a demonstration of a somewhat novel feature embodied in their coil. It is a double spring vibrator and safety valve. The main vibrator is of the usual style, being securely held at the base and occupying the usual relative position to the magnetic core. A second spring of much smaller size is provided, one end of which is fastened to the vibrator spring proper and the other, or free end, carrying the platinum contact. This arrangement, the makers claim, requires less movement on the part of the large spring and permits of more rapid action, and largely overcomes the liability to stick.

The Vesta Accumulator Company, of Chicago, had an attractive display of electric headlights, side bracket and red rear lamps; also automobile hand lanterns in all sizes.

The Chicago Storage Battery Company, of Chicago, Ill., showed a small runabout, mounted on rollers and fitted with the company's batteries, the vehicle being kept running almost continuously. In the cells of this company the electrolyte consists of an alkaline solution, the positive plates are said to be formed of chemically transposed metals and the negative plates are constituted by the metal containing cell itself. Consequently the cell has neither plates nor grids, and, like all cells using an alkaline electrolyte, it gives a much lower electromotive force than a cell containing a lead couple. The working pressure per cell is said to be about 1.25 volts. It is claimed that the cells are hermetically sealed after the elements and electrolyte have been placed within the containing vessels. This makes it unnecessary to maintain the specific gravity of the solution by adding constituents from time to time, as is required by acid cells, and all spilling is prevented.

BRANDENBURG BROTHERS & ALLIGER

had an exhibit of products of the Aurora Automatic Machine Company, manufacturers of the Thor motors, and complete sets of fittings; also the product of H. F. Trebert & Co., manufacturers of two and four cylinder motors for automobiles and the Trebert transmission gear. In addition to this, the exhibit included automobile tool rolls, motor cycle saddles and chains.

THE CUSHMAN MOTOR COMPANY,

of Lincoln, Neb., exhibited a two cycle stationary engine of 3½x3½ inches cylinder dimensions and weighing complete 150 pounds, driving a Watson dynamo, supplying current to 31-16 candle power incandescent lamps. The outfit brought the lamps up to their full brilliancy and was capable of picking up the load from a standstill. It is provided with a throttle actuated by a governor. The engine was claimed to be of 3 horse power and the position of the throttle led the writer to believe that it would have easily carried ten more lamps without overloading.

THE AUTOMOBILE EQUIPMENT COMPANY,

of Indianapolis, Ind., were showing a line of accessories in the way of leather chain boots, rain aprons, engine cases, etc., in conjunction with several of the vehicle manufacturers to the vehicles of which their goods are made to fit. These vehicles are, among others, the Olds, Waverleys, Nationals, Wintons, Ramblers, Mobiles and Locomobiles.

There were shown many forms of mechanical lubricators, these devices having received much study by various manufacturers, among others the John F. McCanna Company, of Chicago, Ill. Such lubricators are one of the things to the value of which the industry is just awakening. Once adjusted for the duty to be performed, such

Groups of Exhibits at the Chicago Show.

lubricators should require no further attention than an occasional inspection.

Nearly all of the automobile tires exhibited at the New York Show were again to be seen at the Coliseum, and with the exception of the product of the Tenant Auto Tire Company, of Springfield, Ohio, there was nothing new to be found in this line. This company exhibited a new form of puncture proof tire, having a thin steel plate embedded in the tread and cushions of sponged rubber at the sides. The tire appears very resilient, considering the method of construction employed. The size of the air tube is only slightly decreased and the construction is claimed to prevent any cracking of the tire, thus increasing its life.

There was the usual variety of automobile gas headlights, but only one of Western manufacture, and that is as yet but little known to the trade, as it was just introduced to the public. The manufacturers are the Hine, Watt Manufacturing Company, of Chicago, and the lamp is of the type known as "balanced draft." Superiority of combustion is claimed, air being taken in at the top of the lamp, and brought down between the shell and reflector, and then passing up through an opening in the reflector surrounding the burner.

THE AMERICAN GASOLINE MOTOR COMPANY,

of 69 West Jackson boulevard, Chicago, exhibited their planetary transmission gear, which they make in three sizes and two general types, one giving two speeds forward and reverse and the other only one speed forward and reverse. The gears and pinions run in oil and are said to be made of machine steel and hard brass respectively. An improvement has recently been made in this gear by which instead of two sets of pinions for the slow forward and reverse speeds respectively, only a single set is used. An emergency brake has also been added, which is operated direct by the speed control lever.

Some New Vehicles.

THE SPEEDWELL AUTOMOBILE COMPANY,

of Milwaukee, Wis., exhibited a gasoline runabout with double opposed cylinder motor. The cylinders are of 4½ inches bore and the piston stroke is also 4½ inches, and the engine speed is variable between 150 and 1,200 revolutions per minute. The motor is dust proof and is claimed to be well balanced. The transmission is of the planetary type, giving two forward speeds and one reverse, all operated by a single lever. At high speed the gear is entirely out of operation. The rear axle is supported on four tool steel roller bearings and the front axle is equipped with ball bearings. The spur compensation gear, brake wheel, sprocket and chain run together in a dustproof case. Both axles are trussed with steel truss rods and the wheels are of the tubular steel artillery type. The entire propelling mechanism is supported on a spring hung angle iron frame, making the body easily detachable. The ignition is on the jump spark system and the engine speed is controlled by simultaneously varying the time of ignition and the position of the carburetor throttle. The cylinders and all motor bearings are lubricated by a positive oiler. Wheel steering is fitted.

THE NATIONAL MOTOR VEHICLE COMPANY,

of Indianapolis, Ind., exhibited their various models of electric vehicles and a new model styled No. 120. This is claimed to be an electric long distance car having all the "ear marks" of a gasoline car. It has a brass hood in front, three front lights, a horn, wheel steering, and the general appearance of a gasoline touring car. The special feature of this vehicle is the arrangement of motor and differential within a dust and water proof casing forming part of the rear axle housing. The seat of this vehicle is large and roomy, and the battery is divided, 16 cells being placed under the hood in front and 20 in the rear part of the body. The wheels are 32 inches in diameter and are equipped with 3½ inch tires. The same vehicle will also be built with a tonneau body, but this type could not be gotten out in time for the show.

THE FRIEDMAN AUTO COMPANY,

of Chicago, showed their 1903 models of gasoline carriages with friction drive, in which the following improvements over their last year's model have been embodied: Drop forged connecting rods, improved friction plate, vibrator coils, new switches and spark plugs, and a new mixer. In addition to this model they will manufacture a machine with a two speed gear and a single cylinder engine, with the general outlines the same as those of the 1903 model. Two features which the two machines will have in common are that they are operated from the left side and that the engines are started from the seat.

THE SANDUSKY AUTOMOBILE COMPANY

exhibited their Sandusky runabout, which is a light 4 horse power machine, weighing about 600 pounds. The motor is a single cylinder, horizontal one, and is said to propel the vehicle at speeds up to 25 miles per hour. Three gallons of gasoline are carried, which are said to be sufficient to run the machine 100 miles. The engine speed is controlled by a throttle operated by a pedal. The gear gives two forward speeds and one reverse. The running gear frame is built of angle iron and is supported on side springs. The ignition batteries are carried in front in a curved dash. The body is provided with a roomy seat for two persons, which is all the carriage is claimed to be intended to carry. The wheels are of wood, 28 inches in diameter and provided with 2½ inch tires. The wheel base is 65 inches.

Steam Cars at the Cryst Show.

By J. S. V. Bickfor

THE GARDNER SERPOLL

The general outline of this c well known, but some modific lately been introduced which terest.

It may be remembered that water feed of this car are both by pumps, all the oil pumped burn, there being no return oil and water pumps are of cert proportions and the ratio of th to one another is fixed, though strokes are variable. By this pumps deliver a certain defin tion of water and oil every str delivered always being able t all the water. In the older fo the pumps were actuated by cam shaft having a series of cir on it. To vary the stroke it necessary to shift the cam side the eccentricity of the plate b operation varied. This now giv a Stevenson link motion, whic me a step in the right directi not easy to get any definite fi the pump strokes, but the fol fair approximations: Wate seven-eighth inch; oil plunge inch; strokes in the proportion The boiler is of the flash ty latest types are of considerabl must be of great weight, as th said to be 4 millimetres thick. T the car rated at 40 horse powe of solid drawn steel 20 millime by 12 millimetres bore.

A length of this tube is coile

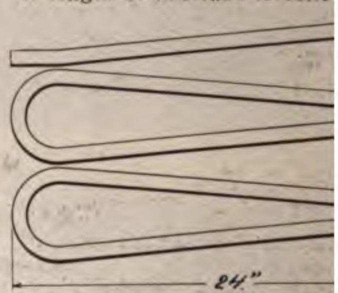


Fig. 1.

form shown in Fig. 1 and for of the boiler. There are sev one tier and twenty-four tiers i each turn being 2 feet long. found that this works out to th able total of 65 square feet ext ing surface. The thickness being tres the tubes without casing about 400 pounds. The car is of 40 horse power, and would brake this for a short time, little difficult to believe that an this power could be develop uously. The maximum output o boiler might be taken, proba at 8 pounds per square foot p a total of 500 pounds of steam

The Automobile Club trials show that about the lowest figure which can safely be assumed for the steam consumption of small steam engines is about 25 pounds per horse power hour. At this rate this boiler would provide 20 brake horse power. It seems to me that it is about time that some agreement was come to as to the powers of cars. It would at present be perfectly fair for any maker to list his cars by their indicated horse power, which in the case of this size engine would be 50 per cent. or more above the brake horse power. On the other hand, the powers found by momentary bursts of speed up a short hill may be, in the case of a steam car, enormously in excess of the steady steaming capacity. It is even difficult for an honest manufacturer who does not wish either to prejudice his own goods on the one hand, or to deceive his customers on the other, to know exactly how to rate a steam car.

Returning to the Serpollet, the engine, as is pretty generally known, is of the four cylinder single acting type. I inquired whether there was not considerable trouble in keeping these small cylinders tight (they are only about 2½ inches bore), and was told that in the earlier engines there had been a lot of trouble due to warping with the highly superheated steam used, but that in all the latest engines the cylinder barrel is made absolutely distinct from either the valve box or the crank chamber and is squeezed between the two latter parts by four bolts, as shown in Fig. 2. This allows the cylinder to freely expand with the heat and no distortion takes place.

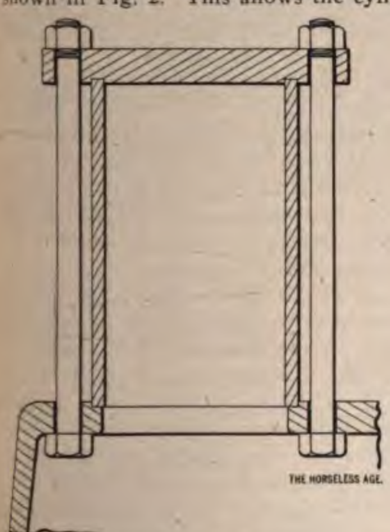


FIG. 2.

If the pressure in the boiler becomes excessive the water is allowed to draw in from the coils by a special safety valve on the steering column. This consists, as far as could be seen, of the following arrangement of parts (Fig. 3):

The boiler pressure acts on a piston A working against the spring B. The stem of this piston carries a small parallel valve spill C with a hole D in it. When the boiler pressure rises excessively the spring is compressed and the hole in the spill C is brought opposite the holes E F, allowing the water to flow to the tank. On the stem C outside the cylinders is a small hand lever G for relieving the pressure in the boiler at will.

The steam lever is actuated by the left foot, while the boiler pressure is controlled to some extent by the water pump. Any designer of steam cars with wheel steering will have found a difficulty in conveniently arranging the steam lever. If this be left at the right hand side of the driver's seat, as in the usual runabout type, it becomes rather difficult to manipulate the car in intricate traffic where both hands may be wanted on the steering wheel for a short time for rapid turns. This difficulty is met in several ways, but it is probable that if a foot lever can be made to work sufficiently sensitively it will be the best arrangement possible.

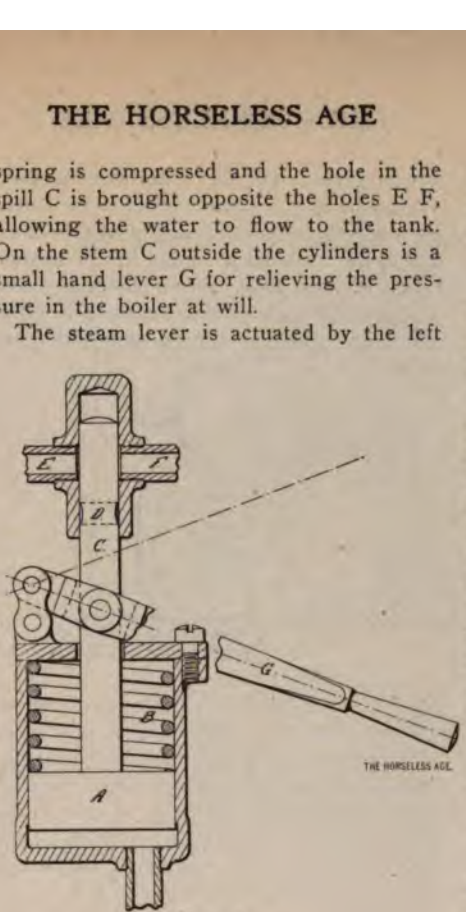


FIG. 3.

THE CYLINDER LUBRICATOR.

These cars are said to take a considerable amount of oil, though some users do not complain on this score. In any case, however, with such highly superheated steam a steady supply of oil is necessary. To insure this an oil pump is used. This is operated by a small cam A (Fig. 4) cut on the rotating spindle B and bearing against the fixed roller C. It will be seen that as the spindle B rotates the roller and the spring D will cause it to have a reciprocating motion along its axis, and this operates the oil pump. The whole gear is in the oil well itself.

THE RUNNING GEAR DETAILS.

The following points will be of some interest. There are no radius rods in this car, all the chain strain being borne by the spring attachments, which are very strong. The chain tightening arrangement is simple and effective (Fig. 5). It will be seen that the lever A attached to the frame B carries the lower end of the link C, which in turn carries at its mid-height the end of the spring D. The upper end of the link is held by the threaded eyebolt E, the end of which is held by the two nuts F F and the projecting plate G attached to the frame of the car. It will be seen that by manipulating the nuts F the upper end of the link may be made to move backwards and forwards, thus changing the position of the rear axle, which is of course rigidly attached to the spring, and with it altering the chain adjustment.

I omitted to mention that throughout the condenser of this car every tube has a screw plug opposite its end, so that it is easy to clean out the whole inside. This precaution is very necessary, as these condensers foul rapidly on account of the oil in the steam.

The water tank holds 480 pounds of water, and with the assistance of the condenser will last for about 130 miles at a speed of about 25 miles per hour. This gives a net consumption of about 100 pounds of water per hour. The condenser surface is, roughly, 100 square feet, which probably condenses from 50 to 70 pounds of water per hour.

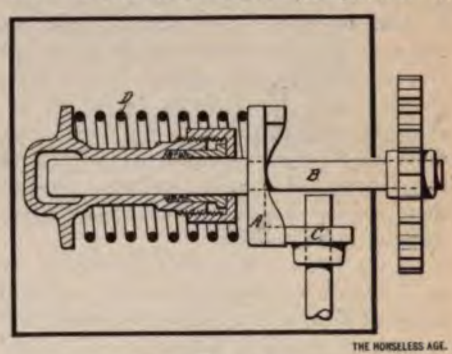


FIG. 4.

(To be continued.)

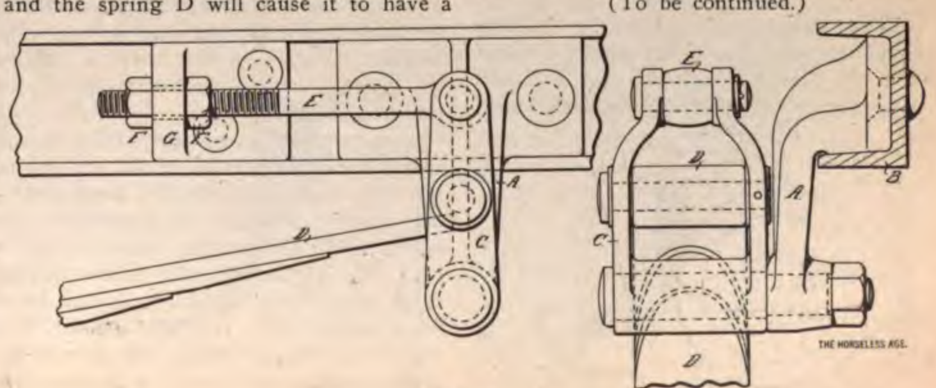


FIG. 5.

Technical Notes on Exhibits at Some Recent English Shows.

By J. S. V. Bickford.

The following are some engineering notes on features of design in late models of English motor cycles and cars, as seen at several of the shows held at London this winter. The article is not intended as a complete report of these shows, but as a summary of the interesting points observed by the writer:

MOTOR CYCLES.

First of all, taking the shows as a whole, there are not very many lessons which can be learned. Spray and surface carburetors are about equally represented in the motor cycles, though in the cars the former is almost exclusively used. Belt transmission is almost universal, though there are a few cycles using chains. Most of the machines have a trembler contact breaker, though there are a few using a magnetically operated trembler on the coil, after the style of the ordinary induction coil, while the primary current is made and broken by a contact breaker on the second motion shaft. The advantage claimed for this is that oil is not so likely to get into the coil case as into the contact breaker, and that the strong spring of the contact breaker will make a good contact, even if there is oil on the contact surfaces. The governing of almost all the motor cycles is about the same. The mixture is set for the time and not altered, while the speed is controlled by the advance spark gear, coupled with the exhaust lifter, an arrangement which seems to work well. Almost all the cycles shown are fitted with some form of battery ignition, though there are two which use the Simms-Bosch dynamo arrangement.

Of the belts it may be said that as far as I remember there was only one machine driving with a flat belt, though that is perhaps the best known of all motor cycles—the Werner. All the rest either use a V belt (one special make known as the Lincolna being much favored) or a twisted rawhide belt. Not one of the machines has the engine in the old position in front of the handles, the engine being invariably located down by the pedal bracket, but not exactly in the same position there.

THE QUADRANT.

There are several noteworthy features about this machine. The contact breaker is of the dead make order; that is to say it does not act the part of a trembler as well.

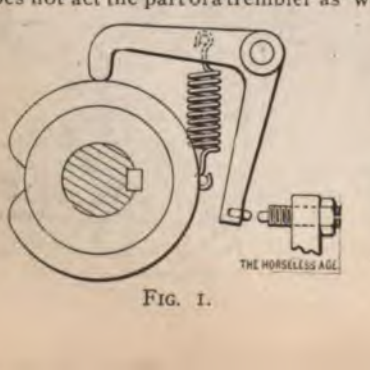


Fig. 1.

Fig. 1 gives a sketch of the arrangement. It may be noted that no roller is used here on the valve stem for lifting the exhaust valve, the valve stem ending in a V shaped block of hard steel. The makers say that it shows no sign of wear whatever. (Fig. 2.) I am myself of the opinion that there

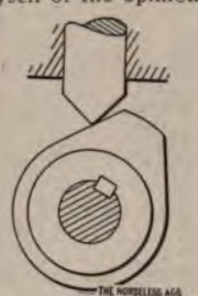


Fig. 2.

has been a good bit of fashion and "sheep following" in this matter, as on the score of reason there is not much sense in putting a roller in this position when the cam is in an oil bath. It will, of course, be understood that the whole mounting of the contact breaker is capable of movement about the centre in the usual way, so as to give the advance of spark necessary. A small stud (not shown) fixed in the plate, which carries the contact breaker, comes under the exhaust cam at a certain point of advance, and in the extreme position the current is cut off altogether at the same time. Fig. 3 shows the switch

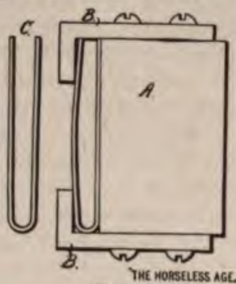


Fig. 3.

used on this machine, which for simplicity and effectiveness would be hard to beat. It will be seen that A is a block of red fibre or non-conducting composition, and B B are two strips of metal, which do not meet and which are connected to the two wires of the primary circuit. Into the space formed between the pieces B B and the block A a broad, V shaped piece C of spring sheet metal fits. This, on being inserted, completes the circuit, while on leaving the machine it is easy to remove the switch altogether and carry it away in the vest pocket.

Another point worth mentioning is the arrangement for preventing the sucking of the lower side of the piston from throwing oil out through the bearings. The place inside the engine, where there is least oil, is naturally the centre of the crank shaft, for all the oil is thrown away from here by the centrifugal action. The makers accordingly place the vent to the crank chamber in the middle of the crank shaft, which is hollow, as shown in Fig.

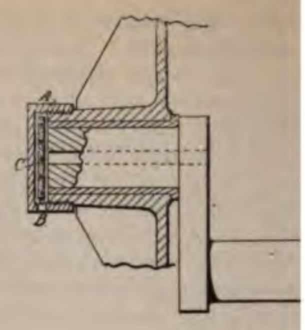


Fig. 4.

4. The outer end of this h
shaft is covered with a cap A
at B, and inside the cap is a
washer C. The action is int
as follows: On the down st
piston a plenum is formed i
chamber, which forces some c
through the bearing, while th
same time runs out the hollow
On the return stroke the wash
against the end of the vent, a
the air is checked, the effe
cause a sucking action of
whereby the oil, which had a
be driven from the bearing c
stroke, is sucked back again.

REACH BARS.

The most striking differe
American and English practi
matter of reach bars. As fa
there have never been any rea
or heard of in England since th
ing days, and they are never u
mobile construction, except in
cases for heavy lorries or g
It seems a little difficult to
they can be really necessary.
most certain that they impart
the running gear which is by n
sirable over rough ground.
every thinking engineer at on
other has wondered why an or
on a carriage or wagon in go
ground does not fail through
knee, so to speak—that is t
does not the spring fail in su
to allow the front wheels to r
der the carriage? The metho
ment is, to an engineer's eye
barous.

The one thing needful to ma
line engine supreme in the fiel
bile construction is the elimin
change speed gearing. If only
cation, uncertainty and wear
of tricks" could be got rid
form of motive power wo
chance. But at the present mo
not seem likely that the pro
solved. Many ways have be
of getting round the difficulty
leys, belts, etc., all have been
turn, leaving the standard thre
The latest attempt in this d
particularly novel, however—w
one of the recent shows by
berger Motorfahrzeugfabrik,
lustrated diagrammatically by

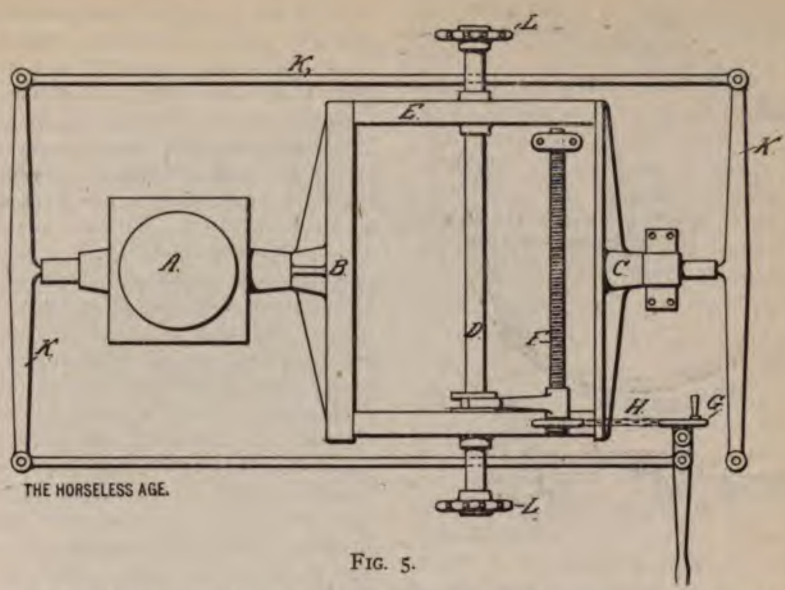


FIG. 5.

The engine A is mounted as usual on the front of the frame, and has its shaft running fore and aft. This shaft terminates in a large flat disk B, and facing this disk there is another disk C. Between these two disks and at right angles to their axes passes the rod D, carrying at one end an idler pulley E fixed in position, and at the other end another pulley I, capable of motion along its axis. This motion is controlled by the screw F and the small handle G on the steering column, the motion from the handle G to the screw being transmitted by a cycle chain H. The pressure of the disks on the pulleys E I is capable of adjustment by the handle J on the steering column and the system of levers K K K. From the end of the shaft, which is feather keyed to the friction pulley I, the power is transmitted to the back axle by the usual chain L. The action is fairly obvious. As the friction wheel I passes in toward the centre of the disks its speed decreases till it is at zero at the centre of the disk. Further motion reverses the machine. The machine as constructed and shown was only for exhibition purposes, the framing, axle, etc., all being far too light for use.

There were also at the same exhibition several of the well known Benz cars. This firm was among the earliest to put a gasoline cycle on the market, and it has adhered to some of the original designs. Among the cars of this make shown there was not a single one with a radius rod. It seems rather a risky business to make the spring attachment take the whole strain of the chain pull in this way, more especially for trucks, one of which is shown. The method of chain adjustment is to alter the point of attachment of the differential gear shaft bearings to the frame. The method is rather clumsy, but probably safe. The truck shown had one or two other points which the writer does not care about. For instance, the distance rod of the steering gear is in compression (being behind the front axle) and will have some fairly severe strains to encounter in daily use in this sort of work, yet it is only a solid steel rod three-quarters of an inch in diameter.

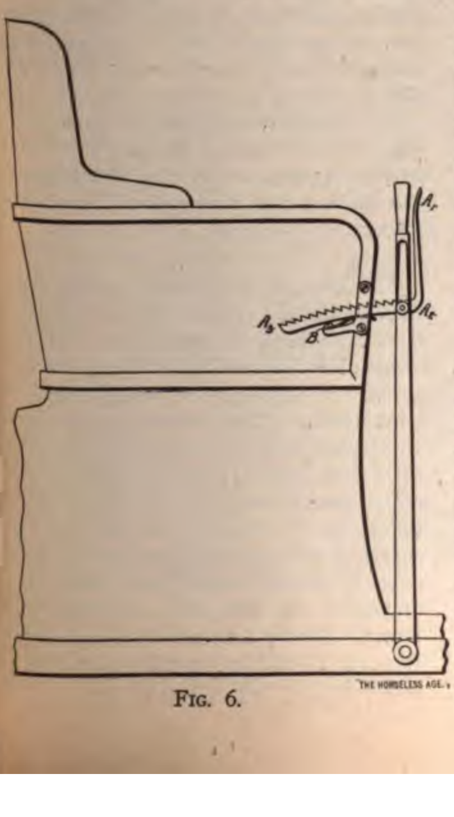


FIG. 6.

E. W. Hart, of Luton, showed among other cars the well known Baby Peugeot, of which I gathered the following structural details: The axle ends are forked instead of being of the pin and socket order, which is now superseding the former in general use. The advantage of the latter form is that it is capable of adjustment for wear, while the forked end is not. The side brake puts on a pair of bands on the back wheels, there being no arrangement to insure uniform tension on these brakes. The hand lever of this brake, which is shown in Fig. 6, is of rather peculiar design, the peculiarity residing in the locking gear. I have been somewhat surprised to what a small extent the old fashioned coach rack is used in motor car work, as it is very hard to beat for efficiency and is absolutely unrivaled for cheapness. Almost every car on the market has some sort of notched sector on this brake handle. This is comparatively an expensive thing to make, and entails a good bit of complication in the way of springs, etc., while it is absolutely unnecessary either for a brake or reversing gear. Everyone is familiar with the ordinary coach brake arrangement with a rack on the side of the carriage. The necessary spring to keep the brake in engagement when "on" is provided by the brake lever itself. In the case of a reversing lever the apparatus has to be slightly modified to allow for the sector being so notched as to prevent movement in either direction. I have had a car in use for some months, in which both the reversing lever and the side brake levers are held in engagement with the notched sectors by the spring of the brake lever itself, which is set with the flat side toward the sector and has a square projection riveted to the side of it to engage with the sector. Fig. 7 shows a rough plan sketch of the arrangement. In my case the levers are about one-quarter inch thick and probably about 3 feet long, and the spring, though amply sufficient to insure the catch stopping in the notch, is still only such as can be quite easily overcome by the hand. In this way all the moving parts of the ordinary notched sec-

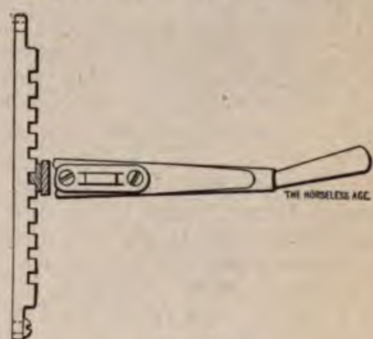
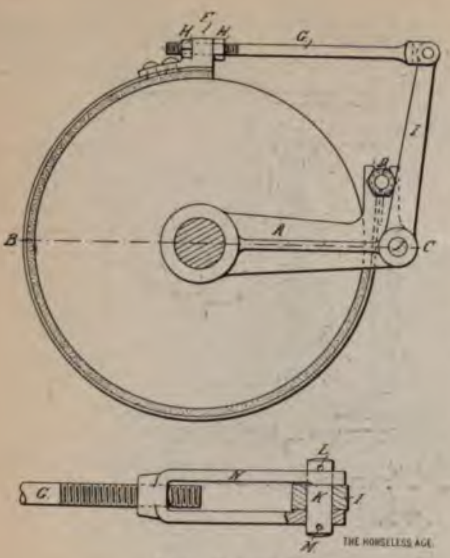


FIG. 7.

tor are abolished and no efficiency is sacrificed.

To return to the Baby Peugeot. The side brake attachment of this car is shown in Fig. 6. It will be seen that the thumb lever (so called because it is not operated by the fingers) is in one piece A_1 A_2 A_3. Thus, when the part A_1 is pressed toward the main lever the part A_3 is depressed against the spring B situated in the staple through which the part A_3 passes. This tail end of the thumb catch, which is about 12 inches long, has teeth along its upper edge as shown, so that when the spring is released these teeth engage with the upper part of the staple and keep the brake in the desired position.

The attachment of the rear brakes is as follows: The piece A (Fig. 8) is rigidly fixed to the axle bearing, the line B C being horizontal. In the notch D lies a bolt which projects past the middle line of the brake ring and holds the end E of the brake band. On the other end of the brake band is a lug F through which a threaded rod J passes, having a check nut



FIGS. 8 AND 9.

H on each side of the lug. The other end of the rod is attached to a short lever I attached to a rod J, passing from one side of the car to the other and carrying the lever which operates the other band brake at its other end. The power from the hand lever is applied to another short lever on the rod J. Adjustment is therefore easy on this car, but in the writer's opinion the arrangement is not all that can be desired. The writer is a great believer in split pins; they never fail, while nuts, no matter how screwed up or how well back-nutted, are constantly loosening on an automobile.

The arrangement shown in Fig. 9 is therefore better, though it does not give quite such fine adjustment. It will be seen that to adjust this it is necessary to take out the pin K, held in position by split pins L and M. The whole piece N can then be screwed along the brake rod G, which is tapped into it. This is not quite so quick a method of adjustment as the Peugeot shown above, but it is absolutely safe and by no possibility short of actual breakage can the brake fail. Further, absolute reliability in a brake cannot be too much insisted on—it is above and beyond everything else on a car.

An interesting novelty is the Beaufort inlet valve shown in Fig. 10. The novelty is in the fact that the whole piece A D

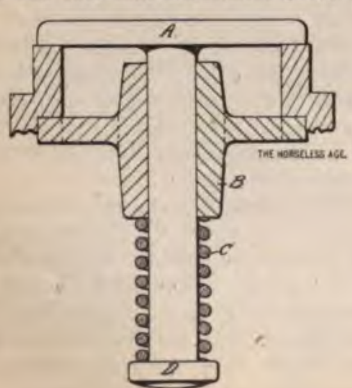


FIG. 10.

forming the valve and valve stem end is in one solid piece. In order to make it possible to put it in its seat the web or guide piece B is made in two parts. The spring C is put on by slipping the head D between the two end convolutions of the spring and then winding the spring round the valve stem just as if one were winding up a reel of cotton. The piece is well made and works very smoothly; it is said to be patented all round the world, and the makers seem to attach great value to these patents, though it is a little difficult to see why it would not do quite as well if the head D was threaded and brazed on.

Messrs. C. Peacock & Co. exhibited an electric car controller, the novel feature being an arrangement which renders it impossible to reverse the motor till the current is turned off altogether while the break is made on a carbon contact. They also handle woven glass accumulators, an article which should be of interest to users of gasoline cars. All the plates of these batteries are wrapped in woven glass, which tends to keep the paste from dropping off the plates, and at the same time prevents any pieces of paste dropping between plates and short circuiting.

The Sieverit blow lamp may interest some of your readers. The burner is shown in Fig. 11. The oil (petroleum or gasoline) enters at A and passes up the tube B to

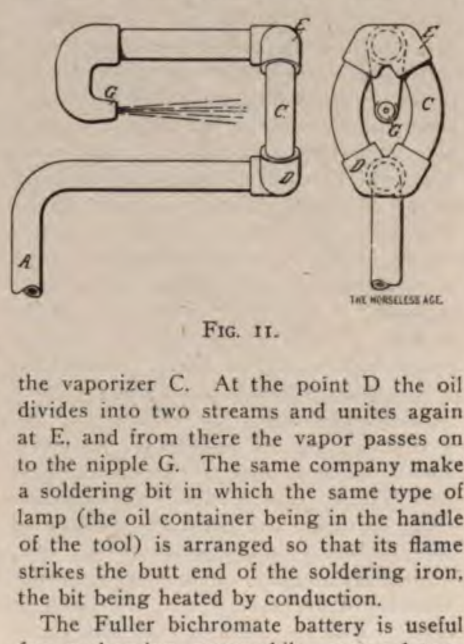


FIG. 11.

the vaporizer C. At the point D the oil divides into two streams and unites again at E, and from there the vapor passes on to the nipple G. The same company make a soldering bit in which the same type of lamp (the oil container being in the handle of the tool) is arranged so that its flame strikes the butt end of the soldering iron, the bit being heated by conduction.

The Fuller bichromate battery is useful for recharging automobile accumulators. The novel feature is that, unlike most bichromate batteries, they are of the double cell type. Further, the zinc stick is in the middle and stands in about 1 inch of mercury, with the result that the zinc plate is always kept thoroughly amalgamated. Dilute sulphuric acid is used in the central vessel and bichromate solution in the outer jar in which the carbon stands.

Another interesting thing is a charging board having mounted with the terminals a glow lamp to act as resistance and a small compass to indicate the positive pole of the circuit.

TWO CYCLE BICYCLE MOTOR.

The only radical departure in the of motor cycles is shown by the Motor Works, Loughborough, S. their Ixion motor. Not only is th

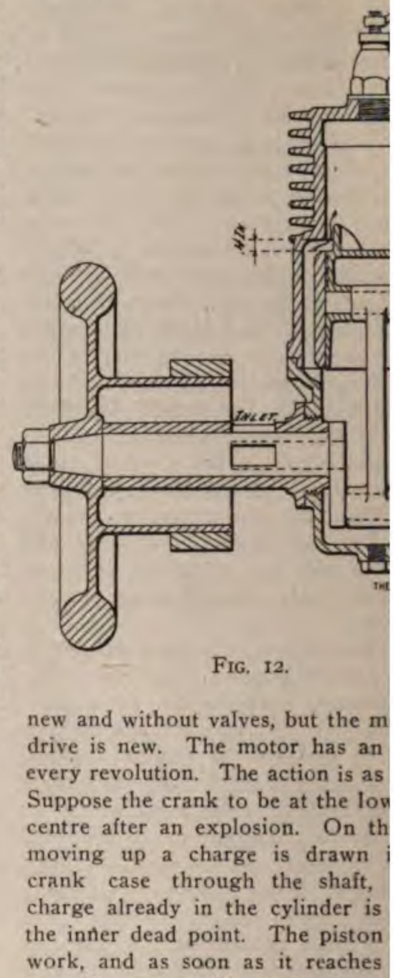


FIG. 12.

new and without valves, but the m drive is new. The motor has an every revolution. The action is as Suppose the crank to be at the low centre after an explosion. On th moving up a charge is drawn i crank case through the shaft, charge already in the cylinder is the inner dead point. The piston work, and as soon as it reaches near the end of the stroke it un hole in the side of the cylinder which the gases escape. A shade down in its stroke it uncovers port communicating with the cran ber, in which the charge is no pressed. The cylinder is then fille charge and the cycle is repeated. tor is mounted on the handle bars on its crank shaft a broad roller may be caused to bear on the fr the drive being frictional. The illustrated in Fig. 12.

The ordinance committee of th Rapids, Mich., Common Council ha upon an amended ordinance to lic erators of automobiles and regul speed. It provides that every au must have an alarm bell or gong o vided with some horn or other sui vice, "the same to be sounded crossings and wherever necessary pedestrians." Every carriage equipped with a brake and carry lamp in a conspicuous place "whe motion at any time after dusk an dawn." Every automobile must the rear the license number in fig less than 3 inches in height.

.ESSONS OF THE .·. ROAD .·.

Years' Experience with a Gasoline Carriage.

BY J. H.

(Continued.)

ENGINE BALKS.

intended to remain at York for days, and not knowing whether or :ould get gasoline there, I thought renew my supply before leaving outh, and again I shut down my After taking aboard all the gaso-y tank would hold, I put on my crank in the presence of a large the population of the town, and hrough all the usual preliminaries ing, but that engine was worse than y horse—it would give one or two dic coughs and stop, and no amount w grease had the least effect. crowd in the meantime had in- in number, and nearly everyone me suggestion to make. I began desperate. There seemed to be a ark, and plenty of gasoline in the etor, but the engine would not start. out my spark contacts, which were make and break variety, and they l to be in good condition. It final-ned upon me that my spark might as hot as it looked, and I decided a spare set of batteries that I carried ergency use, and right here I found uble, for the engine started at the rn of the crank, although the spark t appear to be any larger than that ed by the old cells; but it evidently ed more heat units, for we soon left udience and were on our way to Beach.

crossed the toll bridge over the Pis-a River, paying 15 cents for the ge, and were then in Kittery, Me. m here on the roads were poor, be-ite hilly and formed of clay that was lippery when wet and required care-iving to avoid skidding, as a heavy ll the day before had left them in condition. However, we reached our ation without further trouble, arriv-our hotel at a little past 10 o'clock. rip of 65 miles had been made in five hours, including a little over an spent in trying to make the motor But in spite of our troubles we en-the trip immensely, my friend being more enthusiastic than I, which was s due to the fact that I had done all ank work.

long ride in the fresh morning air raced up our appetites, and after g a deal with the stable boy to wash to, we were soon sampling the good which our host had provided for us.

TEMPORARY TEETH GIVE TROUBLE.

After dinner my friend left to continue his trip a little further down the coast, and I started with my wife for a short ride. The engine ran nicely and started easily, proving that the old batteries had been the source of our previous trouble. We had gone about 4 miles when there was suddenly a harsh grinding sound somewhere under the carriage, and the motor slowed down nearly to the stopping point, and then started up again at full speed. I ran out to one side of the road and donned my overalls to make a close inspection, and soon found that the temporary teeth which I had put into the rear axle driving gear had worked loose, and turned part way around, which resulted in their being cut off when they came in contact with the steel pinion on the countershaft. This was a nice predicament to be in 65 miles from home, but I was getting hardened by this time, and little matters like this didn't jar me as much as formerly.

I decided to run back to the hotel minus a few gear teeth, and when I got there that gear was stripped pretty clean, for every time the bad place came around the steel pinion would extract a few more teeth. I ran the vehicle into the stable and left it until the following day, when with the help of a local mechanic I took out the injured gear, and found that although it was required to stand the entire driving strain it was made of cast iron and of a very soft grade. This was about the sort of construction one would look for in a mowing machine, but it seemed entirely out of place in a motor carriage.

I wrote the factory, ordering a new gear of more durable material, and in about a week received one made of phosphor bronze, which with the mechanic's aid I put in place, and which has run hundreds of miles since, and is apparently as good as ever.

TIRE GETS FLAT.

My brief vacation having ended by this time, I had planned to return home the following day, and had invited a friend of mine, who owned a steam machine, to make the trip with me. We started early in the morning, not waiting for breakfast, but took a lunch along to eat on the road. We made no stop until we reached North Hampton, where I stopped to make a slight adjustment, when my friend remarked that one of the rear tires was flat. And sure enough it was punctured. We pumped up and made liberal applications of tape to the injured part, but it would not hold air, and as we had no repair outfit we were obliged to run it into a nearby barn, where we took off the tire. The owner of the stable very kindly drove us to the depot, about a mile away, where we took the train for home, arriving about the time we should have reached there in the auto.

The tire was sent to the factory for repairs, but in a day or two I received a letter stating that it was beyond repair, having been run deflated and badly rim cut. I ordered a new one, at an expense of $35, which, together with the new gear, at $13, and labor and express, $3.50, made the expense for transportation, exclusive of railroad fares, for the round trip $41.50. By railroad the fare is $4.80 and there is no cranking to do, but in spite of the higher cost I have made the trip several times since in the auto, some of the trips being without trouble and some with loads of it.

PUTTING ON THE NEW TIRE.

When the new tire arrived, my friend and I started in his steam carriage to put it on. The distance from home to where we had left the machine was 43 miles. We got away at 6 o'clock in the morning, thinking we could reach North Hampton in three and one-half hours, which would enable us to put my machine in shape and run to York in time for dinner; but, alas! things did not go as we had planned, and instead of arriving in time for dinner we were none too early for supper.

We had gone about 8 miles and had almost reached Haverhill when the water began to diminish rapidly in the gauge glass, the crosshead pump on the engine not working properly. We spent a short time looking for the trouble, and not finding anything wrong filled up with a hand pump and started on again, but after a few miles we had to repeat the operation, and with pumping water and air, filling water tanks, etc., it came pretty near being a continuous performance. Instead of reaching North Hampton at 9:30 we got there at 12:30, tired and hungry.

We put the new tire on my machine, and then tried to pump some water into the steamer, when the hand pump went out of business. So we started in to find out why, and by the time we had got both pumps into working order, packed the valve stems, and made a few other adjustments, it was 3 p. m. But things were looking better now that we had everything in shape.

From North Hampton to Portsmouth my friend led the way, and set a lively pace, and it was all I could do to keep up. When we got into town we decided to take on more gasoline, and as my engine did not seem to have as much power as usual, I

DECIDED TO TEST THE GASOLINE

I was using. The test revealed the reason for my lack of power, the gasoline testing 68 instead of 76, which the dealer had sold it for.

We hunted up another place, where we tested a sample before buying, and as it was a little better than 75 we took it, and threw away several gallons of the old lot, and on the rest of the run my machine ran so much faster that my friend could not keep in sight of me, and I had to wait several times for him to catch up. This shows what a great difference a poor grade of gasoline will make in the power of an engine.

Since this experience I carry a hydrome-

ter with me and test before buying, and have had no further trouble from this cause.

We reached our destination about 6 p. m., six hours later than we had planned, tired, hungry and dusty; but a wash, clean clothes, a good supper and a sound sleep put us in prime condition for the return trip next day, and we made the journey home without a mishap of any kind.

I also made the trip a couple of weeks later, stopping the carriage only once to take on a little water, but the engine did not stop during the run of 65 miles, which we made in three and one-half hours.

I ran my carriage late into the season, having many pleasant trips, covering several hundred miles, and having but little trouble, but I had found that there were several things about the machine that could be improved upon.

POSSIBLE IMPROVEMENTS.

The oiling device was very crude and wasteful, being merely a brass box divided into small compartments, each filled with waste, and having an oil tube connecting with the bearing. There was no way to regulate or shut off the flow of oil, and on very hot days the oil would run off quickly, and had to be renewed too often. I had also found that whenever I had ignition troubles it was usually the fault of the dry batteries, which I had found to be unreliable. In one case in particular I had been off on quite a long trip, and on the way home my motor missed explosions. It kept getting worse, and when nearly home and while climbing a 17 per cent. grade it missed several explosions and stopped. I got out and put a stone under the wheel and tried to start, but could only get a few explosions before it would stop. I had run on both sets of batteries during the day, changing from one set to the other, so that both were about alike in regard to strength. I connected the two sets in series and tried them, but the result was no different, but when I connected them in multiple the engine started on the first turn and climbed the hill without missing an explosion, proving that it was the amperage, rather than the voltage, that I needed for a satisfactory spark. The experience emphasized the need of some more positive source of current than the common dry battery, and I accordingly decided to put in a magneto generator, to lessen, if possible, my ignition troubles, and a set of sight feed multiple oilers to simplify the lubrication problem. I believe both have done all and even more than I expected. The lubricators run the carriage 200 miles on one filling and use about one-third as much oil as the old method. And as for the magneto, it is gear driven direct from the engine shaft, and has no friction device or mechanical governor, but varies its speed as the engine varies, and is geared high enough so that I can start with it almost as readily as with batteries.

I carry a set of batteries for emergency, but as I rarely ever use them one set lasts an entire season. When my motor runs at its highest speed the magneto voltage is rather high, about 20 volts. I have after a season's use had no trouble from burnt contacts, as I use special hardened points, and have cleaned them but once during the season, and then merely as a precaution, for they had not given me any trouble.

All of the above changes I made during the winter of 1902, while the carriage was out of commission. I also put in a spark advancer which added considerably to the power, and provided an oil tight box for my differential and driving gear to run in, using a heavy oil for the purpose, and three quarts were all I used during the season.

Unsatisfactory "Demonstrations" of Gasoline Vehicles—Experience with Several Steamers.

By Pythias.

In a recent issue your correspondent "G" evidenced his implied satisfaction with a steamer by referring to the fact that he sold his gasoline machine after using the two alongside of each other for a year. But did not the purchase of the gasoline machine, in the first place, prove equally that the steamer did not give satisfaction? It follows, therefore, the steamer must be only comparatively satisfactory. Like Mr. Damon's reliability feature, there are degrees of satisfaction and reliability.

But "Steam Carriage" follows "G" with a recital of experience called forth simply by the diametrically opposed view he takes of the same make of vehicle.

Such reflections as the above caused me to cut short waiting for writers to perfect the automobile, and having devoured the contents of The Horseless Age for several years, to say nothing of the numerous catalogues of manufacturers, I found a favorable pretext to turn over the reins of business to my next in command and hied myself away on a tour of the factories. This required a good bit of moral courage, as there had never been but one "horseless carriage" in our city, on the occasion of a grand civic parade when one of our most prominent citizens and his wife occupied such a carriage brought here temporarily for the purpose of the parade. I only saw the automobile going down hill, which doubtless prevented an otherwise disappointing view I might have taken, for our city is hilly in the true sense of the word, and that was among the first "horseless carriages." Besides, so far as I knew there was not another in my whole State who had braved the curious crowds and borne the odium of having first "skeered" all the "mewls and hosses" in the surrounding country, to say nothing of having to pose as the pioneer to be relegated to common place by certain mortals on learning the "thing" would not fly, but would only propel itself over ordinary roads at 10 to 12 miles an hour.

The "exposed flame" feature of the steamer was sufficient cause for me vocate from the start an internal c tion motor, so it was to this class my first attention.

Without appointment or previc tice I appeared at the factory of w now grown to be the home of one standard American gasoline cars. demonstrator had left the day bef the East, possibly to deliver a n The demand for their cars was s that not a single one was left on tl complete, but thanks to some form tomer coming up who had been in cident—the recital of this accident have done credit to the Empire St press or the Twentieth Century I but, wonderful to relate, the only was a mere disarrangement of the mechanism and a few scratches— agreed that I should wait "a few m until the necessary repairs were f when one of the proprietors woul me something of what their m would do. I waited, and was n prised to see workmen crawling under, into, out of and through the machine.

After a great deal of crankir smoky exhausting, accompanied running explanation of how easy gine was to start when it was "all the vibratory action of the machine seemed to indicate she was ready other wreck. I was then invited to seat beside the operator, and doing first automobile ride of my life Our route lay through the town streets, more or less indifferent, lea the open country. I noticed the o was seemingly averse to changi speed gears, and appeared to pre jars and bumps incident to driving over rough crossings to running t of cutting out the motor and taking car's speed again at whatever it m after having used the momentu brake to carry him easily and c over such rough places. Again, in muddy patches of road, which we comfortably bumpy and rutty, he through on the high speed, which i extremely unpleasant.

Of course there are operators a erators, but I have never yet ridden gasoline car which could be handle the same care and safety in rough as steam power affords. The o above mentioned may have lacke skill which experience gives, but time he certainly had enjoyed as mu perience as I had after using m steamer for the same length of time

Without meaning to praise myself say my machines (steamers) have been handled, even in my most in enced days, in a way so damaging a injurious as I have observed to be tl eral custom among gasoline operat don't know whether this rough ha as compared to the ease of handling ers, comes from trying to show off

of a known defect in gasoline cars or whether it is merely incidental to individual operators. At any rate, it appears to me this difference between the two systems of motive power is of much weight in favor of steam.

The bumps and jars of the road (which on the occasion of this first ride was merely a country road) and the punches in the small of my back given by the thumping impulses of the engine were considered incidental to automobiling, and therefore did not so much detract from the pleasures of my new experience. The operator maintained his grimness of visage and plied his various levers, putting both hands and feet in such furious state of action as to suggest a pretty fair plan of defense in case of a life and death fight with a wildcat. At length we arrived at a cross road leading to a macadamized driveway running somewhat out of the way back to town, a distance of about 25 miles. I was advised to get the swing of the carriage and prepare for fast riding. Fournier may have made better time, but I will wager he did not feel it any more than I did then.

On that ride back to town we bagged a goose and an old shanghai rooster, and the operator individually bagged a customer. Parenthetically I will remark the customer was not the goose referred to. There were some ideas I had about strengthening the steering mechanism, lowering the centre of gravity and lengthening wheel base which had to be talked over with some of the shop people, so my escape from owning one of those first crude machines was due to the manufacturers' refusal to take my order, conditioned upon the changes.

I then tried gasoline machines at intervals throughout my pilgrimage from factory to factory of about 2,000 miles, and to my disappointment never had another satisfactory demonstration.

In Boston I ran across a rig that seemed (on the floor) to be what I wanted. The agent proposed demonstrating what this machine would do that none other would attempt. I got in—he started up the motor and jumped aboard, but his clutch did not work right, he said. Later he blamed the ignition. It was soon apparent something about the little wagon was wrong, for we couldn't move off. He fumbled about for awhile and then perspiringly suggested that if I would come around tomorrow we could take an early start and run to Billerica, I think he called it, and back in the cool of the day—"a fine ride."

I could not wait, and the next machine tried was in New York. By appointment the operator called at my hotel. We started swimmingly as I thought, but he said he noticed an occasional miss of explosions. While he stopped to investigate it occurred to me a machine which vibrated so unpleasantly should be made so as to permit the motor being easily stopped and restarted. He said there was no trouble about "slowing down the motor sufficiently to avoid vibration, just so"—and it slowed down till it stopped. About three hours afterward I passed on my return to the hotel, and Mr. Expert was still assiduously applying himself to the task of restarting.

At a Philadelphia agency a big, roomy, liberally disposed car was the next decided on as embodying the features of my then ideal machine. We started out auspiciously—the run out Broad street was grand in this veritable mogul engine, but a quickly gathering rain storm caused us to turn back. I had just about made up my mind to pay the extra price asked for immediate delivery of this car when the operator found it necessary to throw on brakes to avoid a collision. The street was thoroughly wet, and that ponderous juggernaut pirouetted like a ballet dancer. This was a new experience to me, and explained by the operator showing only one wheel could be locked by means of the differential band brake.

It was raining quite hard now, and heading about the machine was speeded up, but almost immediately began to slow down. The operator jumped out to tighten a clutch, but found a pinion had slipped out of place, by reason of a key or pin loosing out. No other course was left but to desert the ship, which was promptly done. I decided if a machine would fall to pieces on Broad street, Philadelphia, it would not prove more stanch on country turnpikes. On this trip I observed manufacturers generally were disposed to be secretive and rather slow in answering questions, from which the conclusion was reached it was best to take another course of catalogue and Horseless Age study.

Still advocating the internal combustion motor, I was forced, however, to the admission that reliability of operation, the most important requirement in a motor vehicle, was not a characteristic of the gasoline system. Equally as strong was the acknowledgment forced that steamers "got there." As between the difficulties encountered it seemed to be rather a case of defective motive power with the gasoline wagons and structural weakness with the steamers.

The "proof of the pudding being the eating," one of the early designed light steamers was bought, and soon discovered to be too much on the toy order. It was sufficient, however, to demonstrate that the owner of an automobile should be naturally in love with things mechanical to enjoy the machine fully, and that a continuance of the enjoyment was only possible to a real "dyed in the wool" enthusiast.

Another observation taken at the same time revealed to me that a mechanically inclined automobile owner should possess a machine shop of more or less extent, according to the "improvements" his fancy might suggest as necessary to the best operation of his motor car.

Accordingly I bought an 11 inch Star lathe, with taper, gear cutting and milling attachments fitted thereto. As a result many spare hours have been pleasantly spent, besides numerous tools and handy devices have been made from drawings appearing from time to time in The Horseless Age. My power plant consisted of a gasoline engine, which after two years' unsatisfactory use was discarded as being tricky, balky, noisy and dirty. An electric motor was installed, which eliminated the noise and dirt features.

The aforementioned light steamer, being too light, soon showed this defect, as well as developing all ills the auto is heir to. It served its purpose well, however, for in addition to practically demonstrating what a good, serviceable machine should be, I ran it that first season over 3,500 miles of country roads. Excepting the single instance of breaking down the two wheels on one side by skidding into a ditch, there was never a time when it did not come in under its own power. I found advantages, too, in its lightness. In mud or on slippery streets better progress could be made than with heavier machines. It consumed two-thirds of a gallon of water to the mile and averaged 8½ miles to the gallon of gasoline.

At first the oft repeated objection made by gasoline advocates seemed to be confirmed in the great amount of watching and alertness required to keep water properly supplied to the boiler. Other things that appeared necessary to watch were the steam and air gauges. It soon became a matter of as much ease, to say the least, to properly attend to the water supply as endeavoring to properly control a gasoline motor. And as for the steam and air gauges, I did not long find them to call for watching. In a general observance of the machine's working it became easy to see the gauges, and anyhow, as "G" aptly implied, it is less trouble to watch a thing than to search for it.

I never had a foaming boiler in my beginner's experience, but came near burning the boiler once by reason of a leaking check valve permitting the water to be forced back through the piping while the carriage was standing.

I had been advised that light tire expenses would be found characteristic of the light steamer, but the case proved quite otherwise. It was necessary to buy a sufficient number of extra tires, so as to permit of one or two being in reserve and to provide also for one or two generally being on the road to or from the tire factory, there being no place nearer where repairing could be done. Tires were found to be the heaviest expense incurred in the operation of the light machine, not counting the work done from time to time in my own shop, nor the time consumed by my man, who did the grooming, etc. Although my last motor car is of the heaviest class of steamers, I have had practically no tire trouble with the same make of tires as used on the light runabout, and attribute this to the fact that the tires with

which the light cars generally are equipped are not so well proportioned to the weight to be carried.

The light machine being disposed of, its place was filled by a heavier steam machine, with a water tube boiler. There were some features that appealed to one's mechanical judgment in the second machine and others which recommended themselves by reason of their convenience. For instance, a single lever control for both the throttle and reverse is handy.

This second machine is still in commission, and does good service, but by far the most practical motor car I have seen adapted to rough usage and capable of going over all kinds of roads and getting home again is the identical make of steamer discussed by "G" and "Steam Carriage." It is a well constructed road locomotive, in which the æsthetic is given up for the practical, and in which the boiler hangs down until the firebox is where it should properly be. The gasoline tank is surrounded by another tank (the water tank), and the steering pivots and spindles are in proportion to the strains and stresses which sooner or later they will be called to withstand, and the throttle being in the steering post is a decided advantage in the way of enabling one to "feel" his way over the road.

The construction of the rear axle seems perfect to me, and the pivoted front axle and secondary frame of running gear meet every requirement of flexibility. The engine's adaptability to a great range of power is certainly most advantageous, and the burner principle is practically perfect. I consider the location of the smoke flue largely responsible for the satisfactory operation of the burner, and while it is a little warmer than the usual flue on the rear of the wagon, any unpleasantness to occupants may be avoided by using an inch thick felt matting under the seat cushions.

To be rid of ball bearings is more than worth the trouble of occasionally flushing the oil ducts in the spindles with gasoline, which slight atention keeps the spindle oilers in proper condition. With a steam air pump it is fun to keep up pressure in a 12 gallon tank, and the water gauge glass, being on the boiler, where it should be, more nearly shows a correct water register, to say nothing of obviating so much trouble over broken glasses.

The steam gauge is directly on the boiler, thus being connected up stationary, but the air gauge should be, as I have changed mine, mounted stationary with the frame on which the tank rests. This makes a firm connection and prevents troubles incident to a line of flexible tubing.

The hand pump cylinder oiler is dependable and positive in its action—something not characteristic of any other oiler thus far coming under my notice.

The fusible plug doubtless would be difficult to get at, in the bottom of the boiler, where it is usually placed in this particular car. My chief objection to such location of a fusible plug is that in case of fusing the chances are that the burner would be ruined by the water causing it to crack.

The point raised by "Steam Carriage" of inaccessibility to engine parts is well taken, but in my car there is no packing, so far as I have found, that can be blown out. Metallic packing is used throughout, and the cylinder heads are without gaskets, being scraped to a fit.

I expected to hear the point made that so many bell cranks and small connections used in the throttle and reversing mechanism afforded too prolific a source for lost motion. But we can't expect the requirements of economizing in space, in order to keep a car's dimensions of convenient size, to always permit of such disposition of the necessary working parts as will entirely obviate crowding.

After all, a man must be hard to please who grumbles at the automobile, but he alone is safe from worries who possesses an unbounded enthusiasm and the gymnastic proficiency of the "human eel."

A. C. A. Committee Receives Suggestions from Commercial Houses.

In response to the invitation of the Contest Committee of the A. C. A. to about seventy-five of the commercial houses of New York to be represented at a meeting at the clubhouse on February 19, for the purpose of exchanging views in regard to the test of commercial vehicles which the club proposes to hold next May, the representatives of about ten houses were present, as follows: G. W. Lipsey, of Bloomingdale Brothers; A. B. Blumenthal, of the West End Storage Company; J. S. Gette, of the National Express Company; L. P. Starkweather, of the United States Express Company; G. W. Wilson, of Arnold, Constable & Co.; J. E. Kent, of Stern Brothers; A. Herschman, of the Adams Express Company; H. M. Cleaver, of the Niles-Bement-Paul Company; W. Kummer, of Simpson Crawford Company, and George W. Slingerland, of the American Express Company.

Chairman John A. Hill, in stating the objects of the meeting, said that the intention is to make it a practical test within the limits of the city for the several classes of vehicles, one for the class perhaps capable of hauling 700 pounds, and from that up to several tons, and that they should be required to do more than a horse. He then called for the views of those present.

Mr. Kent said he considered electric vehicles satisfactory while in running order, but that the batteries do not last, and in consequence expenses are double those of horse trucks. He had made deliveries 30 miles away on one charge of the battery; then the power began to wear out. What is wanted is something that will last. He had been using a gasoline truck for two weeks, which had covered successfully 60 or 70 miles a day. He thought the test should last a week or two weeks.

Mr. Blumenthal said that he had had a chance to test electric trucks, and had found them unsatisfactory in going to points in New Jersey, as the truck had to come back twice a day to have the battery recharged. On short hauls around the city the expense compared very favorably with that for a horse.

Another speaker, unidentified, said that he had Exide batteries in his station which had made as much as 62 miles on one charge, but one great trouble with electric batteries is the expense required and the poor help provided to take care of them at the garages.

Mr. Lipsey thought that gasoline wagons were all right in long distance running, but in the city, where fifty or 100 stops and frequent starting are necessary a test should include going around corners.

Mr. Gette thought that the tests should include backing against the curbstone and backing through one street to another. Only a truck that would stand these tests would be of any use to an express company.

Mr. Starkweather said he had been making a test with a certain manufacturer in town, but they had confined themselves mostly to electric power and had found that he could get over the ground faster and make a great many more calls than with a horse in the same space of time.

Figures were presented by Mr. Wilson to show that the cost of Arnold, Constable & Co.'s electric vehicles in making 20,000 miles had been 6 cents a mile and that the total per diem expense had been 95 cents for each wagon, including labor, repairs and electricity. The company take care of the batteries themselves.

Mr. Herschman thought a test lasting two or three days only would not show anything. He advocated a truck that could be loaded at the side from the curb. He estimated $25 to be a fair average cost of each of his trucks per month.

Other gentlemen thought that gasoline wagons should have a test of 50 miles with stops; that electric wagons should have a run of at least 25 miles with hill climbing and with at least one stop made half way up each hill; that the demonstration should last at least four days; that the machines should be under guard at night so that no changes could be made; that a fair test between electric, gasoline and steam propelled vehicles would be in making deliveries in the city within the district bounded by Eighty-first and 100th streets, east of Fifth avenue, each to make 100 stops, and that the test should include backing, stopping and turning below Fourteenth street.

The discussion was of rather a discursive nature, and much of it not germane, but after the meeting the opinion was expressed that the committee had received several suggestions which would be considered in connection with the other suggestions they had received in making final arrangements for the tests.

NEW VEHICLES AND PARTS.

The Locomobile Gasoline Touring Car.

(Concluded.)

The Friction Clutch.

The transmission gear of the car is of the common sliding gear variety, giving direct transmission on the high gear and being connected to and disconnected from the engine by means of a conical clutch in the flywheel. This clutch is illustrated in Fig. 1. The flywheel is larger in diameter than is usual with this size of four cylinder motors. In the cut, A is the flywheel and B the cone, which is leather faced (in the latest form steel springs are placed under the leather to make the clutch grip more gradually). The cone is bolted with a check joint to the sleeve C. This sleeve is provided with a bronze bushing D at one end, having bearing upon the end of the engine crank shaft, and is broached out square on the other end, where it slides upon the square section end of the part E. The sleeve C passes through the wall of the transmission gear casing, and the grooved collar on the sleeve, with which engages the fork for operating the clutch, is located within the gear case, as plainly seen in Fig. 2.

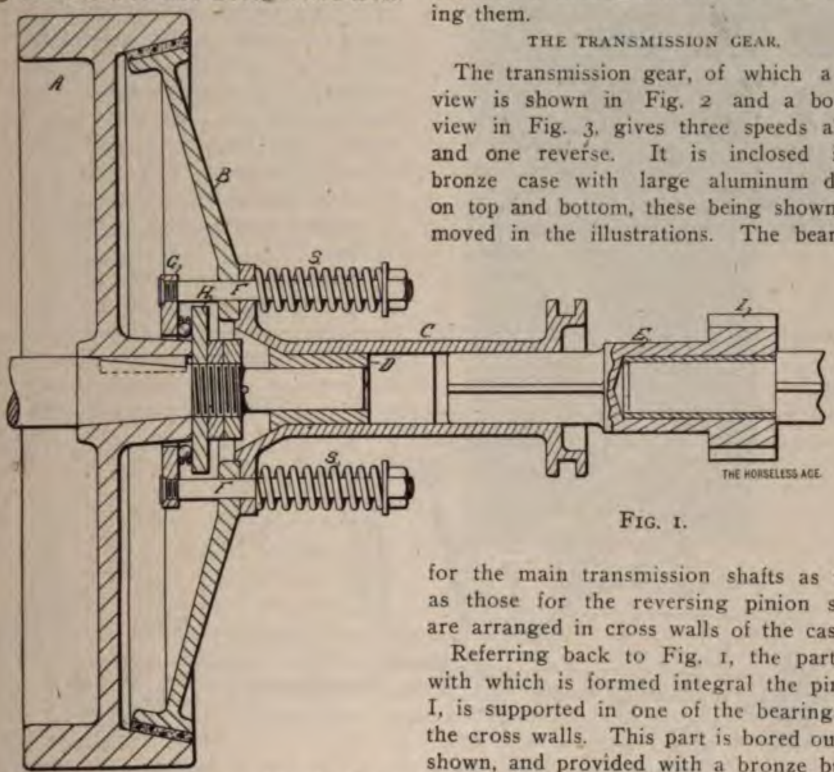


Fig. 1.

The cone clutch is normally held in engagement with the flywheel by four coiled springs S upon studs F secured in the annular plate G and passing loosely through openings in the web of the cone and the flange of the sleeve C. The spring pressure comes on the flange on the sleeve C and on the nuts and washers at the end of the studs F, and when the clutch is in engagement the endwise pressure of the spring is sustained by parts rotating together and not at a bearing. When the clutch is out of engagement (which is the case only while the gear is changed) the end pressure is sustained by a ball bearing composed of a row of balls between the annular disk G and the disk H secured to the end of the crank shaft by means of a nut, lock nut and split pin. The balls are retained in place by a circular ring of wire surrounding them.

The Transmission Gear.

The transmission gear, of which a top view is shown in Fig. 2 and a bottom view in Fig. 3, gives three speeds ahead and one reverse. It is inclosed in a bronze case with large aluminum doors on top and bottom, these being shown removed in the illustrations. The bearings for the main transmission shafts as well as those for the reversing pinion shaft are arranged in cross walls of the case.

Referring back to Fig. 1, the part E, with which is formed integral the pinion I, is supported in one of the bearings of the cross walls. This part is bored out as shown, and provided with a bronze bushing into which extends the end of the square transmission shaft upon which the sliding gears are mounted. The sliding part comprises only two gears, at opposite ends of a sleeve respectively, a grooved collar being formed upon this sleeve close to one of the gears, with which grooved collar engages a shifting fork securely attached to a sliding rod. This rod can be slid lengthwise in its bearings by means of a lever arm upon a shaft (clearly seen in Fig. 3 at the right) extending through the wall of the casing, the lever arm being connected to the sliding shaft by means of a link with forked connections, as plainly seen in Fig. 2. In this figure the sliding gears are shown in the position of the slowest forward speed. The power is transmitted from the clutch shaft E (Fig. 1) to the countershaft by means of the pair of gears at the left in Fig. 2, and is transmitted to the square transmission shaft by the pair of gears seen in mesh near the centre of the case. If the set of sliding gears are shifted slightly to the left the low speed gears will first be disengaged and immediately thereafter the medium speed gears will be engaged. If this motion of the gear carriage is continued the clutch shaft and the square transmission shaft will be solidly connected together by means of a positive clutch arrangement of original design, as follows: It will be seen that the pinion on the clutch shaft has a larger width of face than the gear in mesh with it. The medium speed gear of the sliding pair, which is of course of considerably larger diameter than the slow speed pinion, is cut with internal teeth in such a manner as to just fit over the gear teeth of the slow speed pinion. Thus, when the sliding gears are moved to the limit of their motion to the left, the internal teeth of the medium speed gear engage with the teeth of the slow speed pinion, thus locking the clutch and transmission shaft together and causing the power to be transmitted directly. All gears of the transmission are of steel and hardened. The sliding gears are of three-quarter inch face and the bevel gears have a 1 inch face. All the bearing caps are secured by a nut, lock nut and split pin, a method of construction employed very generally in the machine.

The gears are lubricated by splash, the caps of the bearings being provided with pockets to catch the lubricant as it is thrown up by the revolving gears. The

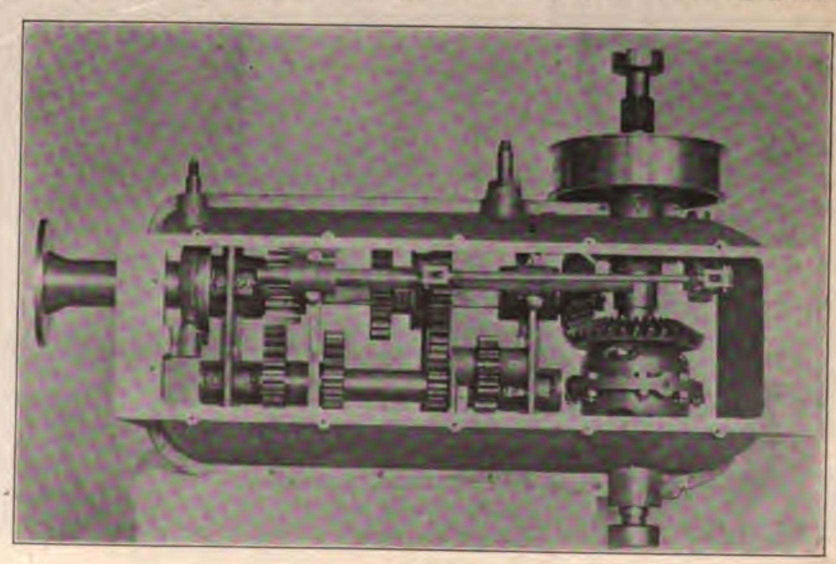


Fig. 2.

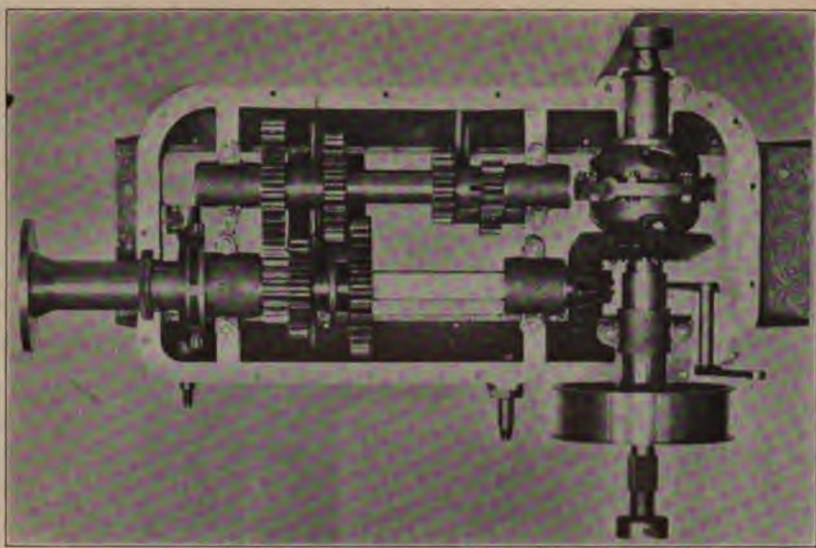


FIG. 3.

bevel transmission gear and the compensating gear on the countershaft are enclosed within the main gear casing. The bevel gear on the countershaft is now made in one solid part with the shaft, and the bearings taking the end thrust of the bevel gears are made in the form of stepped thrust bearings. The reduction of speed through the bevel gears is in the ratio of 32 : 26, the total reduction to the rear wheels on the high gear being about 3 to 1.

On the countershaft just outside the casing is fixed a drum upon which acts a band brake claimed to be double acting. The countershaft is made in parts connected by universal joints of the simplest form, which allow for all possible disalignment between the gear case bearings and the bearings at the end of the countershaft. The power is transmitted to the rear wheels by separate chains, the tension of which can be adjusted by means of chain rods between the countershaft bearings and the rear axle. Brake drums are attached to the sprockets on the rear wheels, the band brakes on these wheels being operated by means of the usual hand lever at the side of the seat.

OPERATING DEVICES.

The steering is by an inclined hand wheel of aluminum with hardwood rim, acting through a worm and wheel sector irreversible transmission mechanism. At the top of the steering column is arranged a spark switch, and on the column just below the wheel a small handle for controlling the carburetor throttle. The change gear is operated by means of a hand lever at the side of the seat, the rear one of the two hand levers in Fig. 4. A simple forward and backward motion of this lever gives the three forward and reverse speeds in proper succession, the lever working on a notched quadrant with one notch for each speed. The brake on the transmission shaft is operated by a pedal on one side of the steering column, and another pedal, located symmetrically on the opposite side of the steering column, operates the friction clutch. Both the brake pedal and brake lever are interconnected with the clutch operating mechanism, so that the clutch is disengaged before either of the brakes is applied.

The vehicle is fitted with aluminum fenders of Mr. Riker's own design, and is very completely equipped with headlights, colored side lamps, and a set of tools. It is the intention of the manufacturers to sell to the customer the chassis only and let him himself select his body construction, thus developing the business something along the lines it has assumed in France. The gasoline tank is the only part of the power outfit that projects above the frame at the part covered by the body, and almost any kind of body can therefore be fitted. A limousine covered vehicle was shown at Madison Square Garden recently, among other styles.

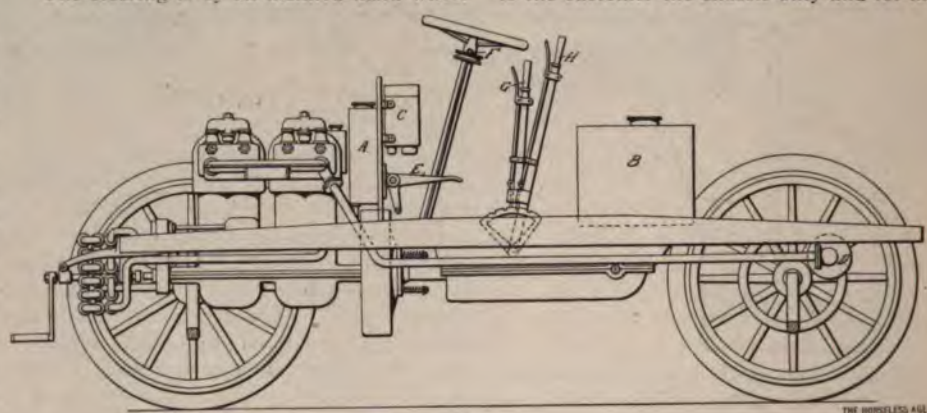
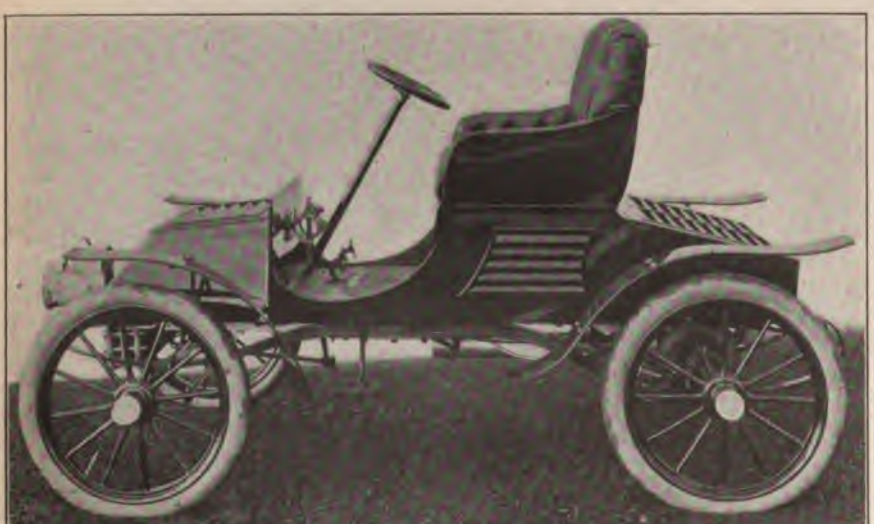


FIG. 4.

A, water tank; B, gasoline tank; C, spark coil; D, muffler; E, clutch pedal; F, throttle lever; G, brake lever; H, change gear lever.

In conclusion, an error in the first instalment of this article should be corrected. The spark lever on the dashboard acts on the circuit breaker or commutator by shifting the commutator brushes, and the forked lever on the grooved collar N connects to the throttle valve only and not to the lever referred to. The wheels are 34 inches in diameter instead of 32 inches.



MITCHELL 7 HORSE POWER GASOLINE CAR.

The Mitchell Gasoline Car.

The Wisconsin Wheel Works, of Racine Junction, Wis., who have so far confined themselves to the manufacture of a motor bicycle, known as the Mitchell, have now entered the automobile field with two mod-

line cars, one of 7 horse power 4 horse power. The former is herewith.

r of this car is a single cylinder, two cycle one, running at 800 per minute. It is supported on be called a false frame of angle fastens to the angle iron side e main frame. The main frame l by side springs of novel con- he forward end of the springs eyond the front axle and fasten- pring arms of the frame.

smission is effected through a ear, giving two forward speeds , and driving direct on the high : two forward speeds are ob- eans of a hand lever and the re- eans of a pedal. The transmis- rear axle is by a chain. The of the artillery tubular steel inches diameter, with 3 inch vehicle has wheel steering, a base, and is provided with mud other essential fittings. The he body is very handsome.

tion of the motor is by jump ime of ignition being controlled lever back of the speed lever, by which the throttle valve is s also located at the side of the lubrication is effected by means ator attached to the dashboard sight feeds. One of these feeds whole of the transmission gear, g led through the centre of the The seat can be tipped for- ive access to the engine. The f copper.

Veeder Tachometer.

eder Manufacturing Company e two forms of tachometers, or rs, designated as Form A and espectively. The former is in- use on automobiles and in elec- stations, and the latter is a strument intended for measur- olutions of shafting and motors. tions herewith refer to Form A. hometer Form A comprises two arts, a centrifugal pump and an he latter embracing a glass in- e, a scale and a reservoir. A w of the instrument is shown in ection of the centrifugal pump nd a section of the indicator in

to Fig. 2, the pump chamber d of two castings, A and B, ether with a checked joint. chamber is located the paddle tened upon the shaft D, the lat- bearings in both of the pump castings, but extending only e of these castings, through a and at the end of the bearing ing. The indicator consists of a nd a glass tube. The reservoir d by a rubber hose or copper the centre of the pump, and the

FIG. 1.—VEEDER TACHOMETER.

glass tube is similarly connected by a tube F with the periphery of the pump chamber, as is well shown in Fig. 2. The pump chamber and the lower part of the reservoir and tube are filled with a suitable liquid, generally colored alcohol, so that when the instrument is at rest the level of the liquid in the tube stands at the zero mark on the scale beside the indicator tube. The surface of the liquid in the reservoir is slightly lower than in the tube, on account of the capillary action in the tube.

When the paddle wheel in the pump is revolved, the centrifugal force draws down the liquid in the reservoir and forces it up in the indicator tube. The vertical height between the two surfaces will be approximately proportional to the square of the speed of revolution.

The connecting tubes or piping may be of any desired length, provided there is at all points an upward inclination from the pump to the indicator.

For convenience the reservoir is placed close to the indicator tube and communi-

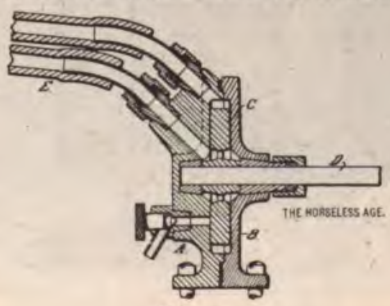


FIG. 2.

cates with the top of the latter, so that the instrument may be sealed to prevent evaporation, and if the fluid should be forced by excessive speed to overflow the top of the tube it will flow back into the reservoir. If the reservoir is placed in front of or behind the indicator tube on a moving vehicle, and the speed of the latter changes, a change in level between the two surfaces of the liquid will take place, on account of the inertia of the liquid and independently of the change due to the pump. A similar change will take place when the indicator is tipped to one side or inclined when the vehicle is going up or down a hill. These changes are, however, very slight and in ordinary practice are said to be negligible. They may be entirely overcome by making the axis of the reservoir concentric with the axis of the indicator tube. This form is employed for the Form C, or portable instruments.

The instrument is certainly very simple in construction, and as there are no wear-

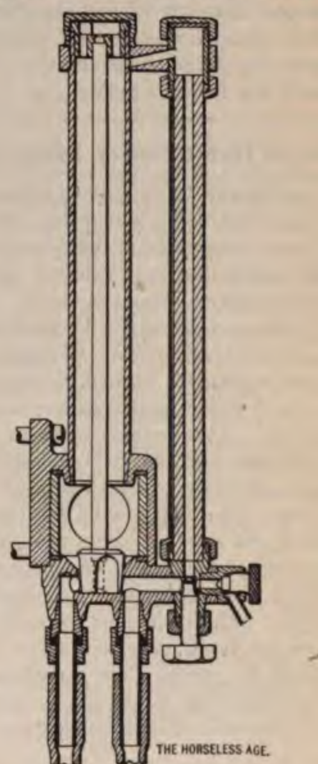
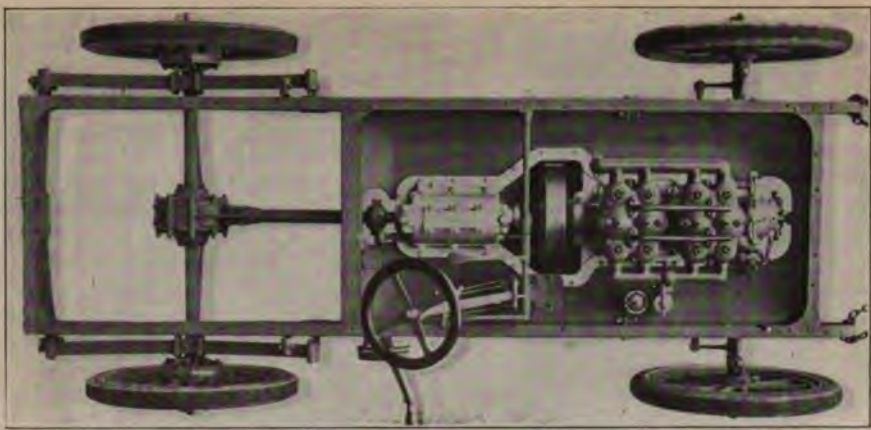


FIG. 3.

ing parts other than the shaft and its bearing it is claimed to be very durable.

To adjust the level of the liquid to the zero mark on the scale the cap on top of the reservoir tube is removed and the liquid poured in, or the liquid is drawn off at the bottom by a suitable cock placed there for that purpose, as the case may require.

For automobiles the scales are graduated to show miles per hour and are of two lengths, 6 inches and 12 inches. The shorter scales are used for maximum speeds of either 20, 30 or 40 miles per hour and the longer scales for 40, 50 or 60. The pump is driven by suitable gearing either direct from the automobile wheel or from



Top View of Chassis.

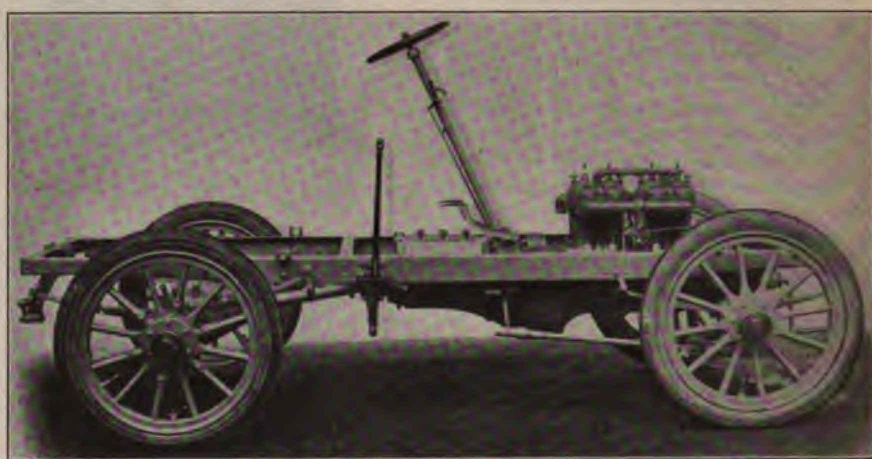
some shaft positively geared to the wheels. The ratio of the gears used depends on the size of the automobile wheel and the scale desired. The indications can be read distinctly only from one-half of the maximum scale indication upward, the reason being that as the height of the liquid in the indicator glass varies as the square of the speed the scale divisions for the lower speeds are rather small.

The 16 Horse Power Decauville Car.

The French Decauville Company have recently brought out a new car which differs in many respects from their former designs. The engine is a four cylinder vertical one, located under a bonnet in front. The cylinder bore and piston stroke are equal, about 4¼ inches each. The exhaust valves and intake valves are located on opposite sides of the cylinders and both are mechanically operated. The arrangement of the pipe connections and caps over the valves is such that each valve can be removed separately without disturbing any of the other valves. Intake and exhaust valves are identical and interchangeable. The connections for the cooling water both pass in at the top of the cylinder jackets, the pipe through which the water arrives leading, of course, to the bottom of the jacket. The commutator is arranged near the top of the cylinders, where it is very accessible, it being driven by bevel gears.

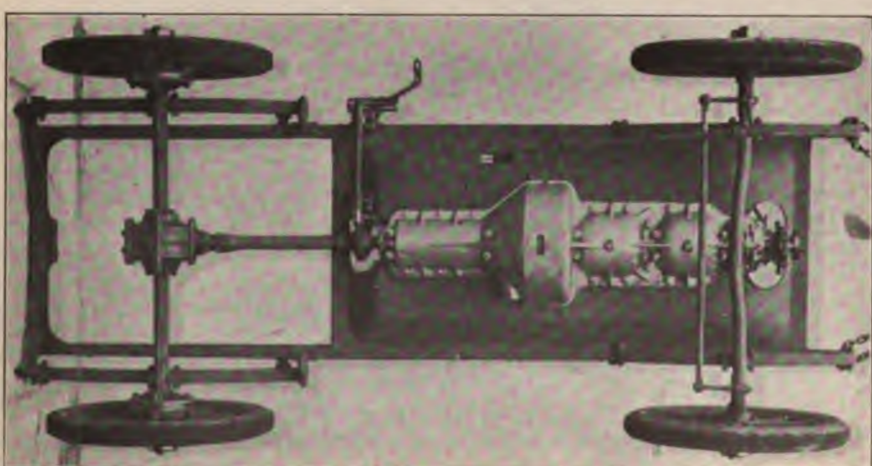
The transmission is of the shifting gear type, giving three forward speeds and a reverse, all operated by a single lever. The drive to the rear axle is by means of bevel gears and a shaft with universal joints. These joints are of a special enclosed type, running in oil. The engine cranks, fly-wheel and gears are enclosed in an aluminum case, the lower half of which is in a single casting, as plainly shown in one of the figures. A sheet metal apron or dust case is fastened to the lower part of the casing and also to the frame bars, forming, in fact, the supporting means for the engine and gear case and preventing mud splashing up on the working parts of the engine, such as the valve springs, commutator, etc. This apron is clearly shown in the two views of the chassis. It is provided with an opening at the both ends to let pass the shafts of the engine and the transmission.

The running gear frame is constructed of pressed steel, and the necessity of gusset plates is avoided by suitably forming the crossbars. The frame is supported on semi-elliptic springs in front, and platform springs in the rear. The steering knuckles are of an inverse design—that is, the pivoted spindles are forked and grasp vertical yokes at the end of the main axle part. This permits of properly bracing the yokes with a web, which would be an impossibility if they formed part of the pivoted spindle. The rear axle is of such design that all the weight supported by the rear springs comes on the rear axle sleeves and none on the shafts which transmit the power from the differential gear to the road wheels. These shafts fasten into the side gears of the differential by means of squared end portions and to the hubs of the wheels by means of a claw clutch at the outer end of the hubs. When the caps are taken off from the hubs the shafts may be withdrawn by prying on them with a small tool, such as a screwdriver. Both hand and foot brakes act directly on drums on the rear wheels, the hand brake being of the expanding ring type.



Side View of Chassis.

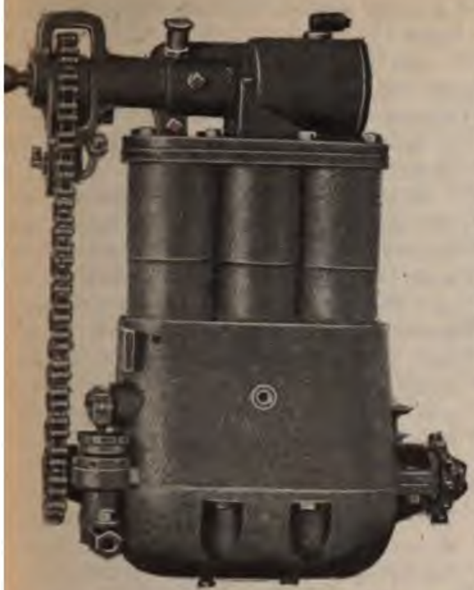
The Decauville Company is represented in this country by the Standard Automobile Company, of 136 West Thirty-eighth street, New York city.



Bottom View of Chassis.

The "Jaxon" Steam Car.

This car, manufactured by the Jackson Steam Car Company, of Jackson, Mich., possesses some novel features. The fire tube boiler is 19 inches in diameter and has 525 copper tubes 14¼ inches long. The burner is of the usual construction and is provided with a pilot light and generator, which are said to admit of starting the fire very quickly. The engine, of which an illustration appears herewith, is entirely enclosed and is of the three cylinder, single acting type, doing



"JAXON" SINGLE ACTING ENGINE.

away with all stuffing boxes, packed joints and many small parts found in the common type of engine. The crank shaft is a solid steel forging and has four large, plain bearings. The connecting rods are fitted with interchangeable bronze bushings on the crank shaft, which are held in place by removable caps secured by steel studs, screwed and riveted into the cap, and adjusted by special slotted hexagonal nuts, which in turn are secured by cotter pins passing through the slot of the nut and the stud. The upper end of the connecting rod also has an interchangeable bronze bushing. The valve is of the rotary variety, being driven by a roller chain from the end of the crank shaft. Its action, however, is said to resemble that of a slide valve, in so far as any slight wear on the valve face is taken up by the steam pressing the valve up to its seat. The motor is reversed by means of a spiral sleeve in the valve shaft, which is operated by being forced in or drawn out.

The running gear is of the reachless type and has a wheel base of 72 inches, the track being standard. The axles are of steel tubing and the wheels of artillery design, ball bearing and provided with 30x3 inches Dunlop detachable tires. The motor is rated at 6 horse power. Thirty-five gallons of water are carried and 10 gallons of gasoline. Three feed pumps are used—the regular crosshead pump, a hand pump and an emergency steam pump. Special fittings provided are a low water alarm, a steam air pump, an automatic air pump and a steam water lift. The body has a solid panel seat and a collapsible front seat, and is referred to by the manufacturers as a surrey type. Side lever steering is used and the brakes are claimed to be double acting. The company also manufacture a lighter rig.

"JAXON" MODEL A SURREY.

Trade Literature Received.

The Sandusky Runabout.—Sandusky Automobile Company, of Sandusky, Ohio.

Air Cooling.—Pamphlet on the subject issued by H. H. Franklin Manufacturing Company, of Syracuse, N. Y.

The White Steam Car 1903 Advance Catalogue.—White Sewing Machine Company (Automobile Department), Cleveland, Ohio.

The Motor Book (Being of Particular Interest to Those Touring in New York and New Jersey).—Brooks Brothers, Broadway and Twenty-second street, New York city.

Jaxon Automobiles.—Jackson Automobile Company, of Jackson, Mich.

The Speedwell Gasoline Automobile.—Speedwell Automobile Company, Horton and Locust streets, Milwaukee, Wis.

Covert 1903 Motorette and Chainless.—B. V. Covert & Co., 57 Richmond avenue, Lockport, New York.

The Cudell 12 Horse Power, Two Cylinder Car, Latest German Production.—J. C. Brandes, sole United States Agent, 28 West Thirty-third street, New York city.

"National" Gasoline Touring Cars.—National Automobile and Motor Company, of Milwaukee, Wis.

..COMMUNICATIONS..

Gasoline Motor Data.

SYRACUSE, N. Y., February 6.

Editor HORSELESS AGE:

Referring to your issue of February 4, the writer was interested in the article by Charles E. Duryea in reference to gasoline motor data.

His article would lead the layman to favor the purchase of gasoline motors according to the size of the cylinders, that is, their displacement, regardless of power or weight. There is just as much difference in the power developed by gasoline motors of given size as there is in steam engines. For illustration, a single cylinder engine of 5 inches bore by 5½ inches stroke, weight 250 pounds, diameter of valves 1.7 inch, with a compression of 75 pounds, showed 5½ horse power on brake tests at 650 to 700 revolutions per minute. The power and speed vary with different engines and also with the carburetor, so that the average working speed could be taken at 675 revolutions for the rated power, the minimum speed at 100 revolutions per minute and maximum speed at 1,000 revolutions per minute. The best power that the motor could develop was 6¼ horse power at 800 revolutions per minute, while a motor of the same make with 4½ inches bore by 4¾ inches stroke, weight 175 pounds, diameter of valves 1.63 inch, compression 93 pounds, developed on brake tests 6 horse power at 700 to 710 revolutions per minute, and on various occasions showed 6½ horse power at 700 revolutions per minute. At a speed of 1,150 to 1,200 revolutions the power varied from 7¾ to 8¼ horse power according to various conditions, such as adjustment of the carburetor and the temperature of the water.

You will note that the motor with 4½ inches bore has considerable advantage over the motor of 5 inches bore both in power and weight. It shows clearly that moderately high compression has considerable advantage over low compression, and with automatic intake valves, using a throttle on the carburetor, so as to use gas in proportion to the power required, you have the advantage of economy in fuel and a very flexible motor for automobile use.

In regard to the proper proportion of gasoline and air, it is taken for granted that the various mechanical engineers who are interested in gasoline motor construction, especially in carburetors, know these proportions; it takes but a very short time to put the proportions down in figures, but it is quite a different proposition to get them right in carburetors. A carburetor may be so constructed that

the engine will start very easily, the mixture seem perfect under light load, and the engine respond promptly to the throttle. It may be interesting to note some tests on a motor with four different well known makes of carburetors. In two cases three different sizes of the same make of carburetor were tested on the engine, to ascertain the best size of carburetor. We will class them as follows:

Make No. 1 showed a pull on the scales varying with the three different carburetors of the one make from 45 to 62 pounds.

Make No. 2, of which there were three different sizes, showed a variation in the pull on the wheel from 51 to 65 pounds; it absolutely refused to work when the throttle was wide open and no adjustment possible would overcome the difficulty. However, it was benefited some by changing the size of the air space.

Make No. 3, of which there were two carburetors, started the motor on one or two turns of the crank, when properly set, and the motor showed a pull on the scales of from 78 to 85 pounds.

You will note that the same motor was used throughout the tests and that the tests were continued for four days. The speed of the motor was allowed to run at 800 revolutions per minute, as this was considered its normal speed. In other words, the brake was applied so that it brought the speed of the motor down to 800 revolutions per minute, and the weight was then taken on the scales.

With make No. 4 there were such difficulties in starting and such unevenness of speed that the tests were not made.

There is but one way to test motors ready for shipment, and that is to take the power off the wheel just as long as the wheel can be kept cool enough to be safe. This shows immediately whether the motor is developing its power, and if there is any difficulty the trouble can be traced and located in a very short time. A record should be kept of each motor, showing the pull on the scales and the size of the wheel at the normal speed or speed that the power is rated at.

Fred S. Perkins.

A Trip in the Rocky Mountains.

Editor Horseless Age:

The frosts were just beginning to paint the trees in their autumn colors, when at 4 p. m. on Saturday, September 4, 1902, in company with W. W. Price, a prominent mining broker of Colorado Springs, the writer started in a 15 horse power gasoline touring car, of opposed cylinder type, for a trip from Denver to Leadville.

The ride from Denver to Colorado Springs was like a dream, being over smooth roads. We arrived in the Springs at 10:30 that night, having lost some time with a hot crank box. The next morning at 6:30 we left Colorado Springs for Cripple Creek, this town being about 38 miles distant, going by way of the Cheyenne Mountain road. It is an exceedingly picturesque route, and more than once as we slowly wound around the curves did we make a short halt to look at the scenery. Soon we came out on a divide and were compelled to emit a shout of surprise as we beheld the great mining camp lying nestled below us in a bowl shaped depression among the hills. A few minutes' stop here and we found ourselves climbing out of the Cripple Creek bowl on our way to the north.

We sailed along a beautiful road to Divide, which is on the main line of the Colorado Midland Railway and at which point the Midland Terminal Railway branches to go to Cripple Creek. At Divide we had lunch at 1 o'clock and then sailed for 8 miles over a 3 per cent. down grade.

We were soon at the old town of Florissant, which has not gained or lost any to speak of in the last twenty years. Our next objective point was Hartsell, reached part way by mountain and part way by park roads, the last few miles before arriving there being through the southern extremity of South Park. From Hartsell we swung up over Hill Top Pass, a modest little hill separating South Park from the Arkansas River Valley. When we reached the summit, at an elevation somewhere near 10,000 feet, which is below that of Leadville, we beheld a really enchanting view phalanxed before us. With the broad Arkansas Valley intervening, rose some of the most majestic peaks of the entire Rocky Mountains. Among some of those to be seen were Mt. Harvard, Princeton and Yale peaks, all at an altitude of over 14,000 feet.

The ride down to Buena Vista unfolded one long panoramic view of mountain scenery. At Buena Vista we realized that we must hurry if we wanted to reach Leadville, 38 miles distant, that night, as it was then 5 o'clock. But at 10 o'clock we bowled up to the palatial Leadville residence of A. V. Hunter. Here we were entertained royally the following day, which was Sunday, and on Monday morning at 6 o'clock we all started for Denver, 142 miles from Leadville, via Mosquito Pass, for Mr. Hunter had given way to our urgent invitation to accompany us back.

"It is just 12 miles from Leadville to the top of the pass," said Mr. Hunter, "but when we get there we'll think it's 100." This was indeed reassuring. I said nothing, but looked for consolation in Mr. Price's face, which was a dead blank.

About 7 miles from Leadville we came to the top of the timber line. From this point on the roads were composed solely of sharp rocks, very wearing on the tires. Almost a mile from the top of the pass we heard a loud report and found that one of our tires had collapsed. It took about forty minutes to replace it with a new one and we were once more on our way. A few more zizags and a few more letter S's to overcome the grade, and with shouts of joy we slowly rose over the summit of the pass. It had taken six and one-half hours to go [...] miles.

"See that immense, rugged peal[...] Mr. Hunter, pointing to the on[...] seemed to be the daddy of all. "W[...] is Mt. Massive, the highest peak i[...] rado."

At 12:35 we sat by a snow bank [...] our lunch. We had snow for wa[...] scenery for dessert; but as it wa[...] chilly even at midday at this eleva[...] had no desire to stay long, so we w[...] dropping down on the other side [...] pass. As we came down by the [...] mines the miners rushed out to see [...] was, some of them having watc[...] progress down the hill for a mile b[...] Hunter passed the bottle and cig[...] which made the boys all feel more [...] paid for the interest taken in our [...] Seven miles below the summit w[...] timber line, and 10 miles below tim[...] we came to a little town by the [...] Alma. We then encountered a bea[...] mile stretch of road to Fairplay. [...] could see the extensive placer minin[...] tions by hydraulic pressure. A thi[...] ute stop at Fairplay and we wer[...] again, coming out on the northern [...] of South Park. The roads throu[...] park are as level as a boulevard.

Our next stop was at Grant, whe[...] rived at 5 o'clock and had supp[...] had broken a spring a few mile[...] Grant, which we had repaired w[...] were eating our supper. We we[...] spinning around the edge of the [...] anxious to get over the most da[...] roads before dark. Darkness soon [...] us in the canyon and it was a slight[...] ous task to keep from bumping aga[...] mountain on one side or droppi[...] feet into the stream below on the o[...] was a great relief when we finally ca[...] Turkey Creek Canyon, near Morri[...] beheld the lights of Denver 20 mile[...] east. From there the roads were e[...] and we made good time, considerin[...] dark, and we arrived in Denver [...] after 11 o'clock.

What will probably interest the [...] most is: How much trouble did w[...] It is very common in auto tours to [...] bright side and leave the other u[...] will tell you some of our troubles a[...] I think would remedy most of th[...]

As before mentioned, we had the [...] tal, opposed cylinder type of gaso[...] the engine being hung in the cent[...] channel iron frame supported w[...] screws through the water jacket. T[...] struction is faulty. First, the loc[...] the engine is on the frame, where, [...] is any twist, it comes at this poin[...] causes undue strain on the cap scr[...] support the engine, which in turn [...] these to become loose and the wate[...] from the water jacket. This cause[...] most trouble. A front mounted ver[...] gine hung to the frame from the cr[...] would have saved us this trouble.

The car had but two speeds [...]

which is wrong for a touring car; for when our engine would not handle a load on the high gear we had to drop back to 6 miles an hour on the slow speed. This in turn would boil our water, using it up very fast, as the engine would be running at a high speed with little air passing through the cooling coils. We could have made better time with less wear and tear to our machine if we could have used intermediate speeds. The throttle on a gasoline engine can be used to good advantage on level roads, but when you overload the engine you must drop to a slower speed to allow the engine to speed up and get the proper mixture.

The friction clutch transmission is faulty for heavy work, and we tightened the clutches a great many times, and if they were allowed to slip very much they would burn the oil from the gear box. In my opinion the sliding gear is the only gear on the market today suitable for a gasoline touring car. On heavy grades we had to keep our crank case drained of oil to prevent it running into the back cylinder. Oil in this cylinder would put it out of condition at once, until we had cleaned the cylinder and sparking plug. The vertical engine would entirely overcome this. The end of the sparking plug is located too close to the carburetor, causing the current to arc from the end of sparking plug to the carburetor float chamber, which is very liable to catch fire if there is any waste gasoline on it. Also the gasoline and water tanks are supported in their frame with stove bolts without lock nuts. These bolts were continually coming loose and losing out.

The chain was not sufficiently strong, as on this car, which was new and this its first trip, we tore the chain in two a number of times. In addition we had, of course, other minor troubles which are common to any gasoline car.

W. J.

Engine Queries.

Editor HORSELESS AGE:

Will you kindly give the writer, if possible, the bore and stroke of cylinders, the bore of valve chest and the size of port holes necessary for an engine to run a steam carriage weighing about 900 pounds with 28 inch wheels at the rate of 40 or more miles an hour?

As the power is to be transmitted from engine to rear axle by means of a chain, kindly state the number of teeth required on engine shaft and gear in order to run a vehicle at this speed and yet be a good hill climber.

A flash boiler is to be used in connection with the engine and a pressure of 250 pounds is to be maintained.

W. WARMECKE.

[A double cylinder 3x4 inch engine would give enough power at 250 pounds boiler pressure to run the carriage about 40 miles an hour on a smooth road. For piston valves we would suggest a bore of 2 inches and ports 2x⅛ inch. Eighteen and thirty teeth on the engine and differential respectively should be about right. Whether the vehicle will have sufficient hill climbing capacity will depend mostly upon the boiler. —ED.]

Oil Cooling.

BRITTON, S. D., February 14.

Editor HORSELESS AGE:

A new departure in a stationary gasoline engine has recently been installed here. The engine itself is on the same lines as the ordinary water cooled motor, but instead of using water for cooling purposes oil is used. By using a grade of oil that will stand extreme high temperature why would not this principle be particularly adapted to automobile use? An engine will run just as well even though the temperature goes above 212° Fahr., or boiling point, which is really the limit with water, while with oil this temperature could be doubled without injury to the motor and without loss of the cooling fluid. Why don't some manufacturer of automobiles take up this system?

E. A. COOPER.

Wear of Tires Affected by Vehicle Design.

LONDON, W., February 12.

Editor HORSELESS AGE:

I do not know if it has been brought to your notice, but it is somewhat interesting to see that in the result of the recent tire trials the tires which scored the first and second places were both fitted to Napier cars.

In the open competition only two Napier cars ran and the tires which were fitted to them both took the two prizes.

I have always contended that the correct design of a car can save the tires to a very great extent, and I think this has never been more clearly shown than in the tire trials under notice.

It is a matter well worth keeping before the public in the purchase of motor carriages to see that they are so designed that they cause the least possible wear and tear to the tires themselves.

S. F. EDGE.

[We quite agree with Mr. Edge that the vehicle itself, aside from its weight, has considerable influence on the life of the tires. Probably it will be expedient in future tire trials to stipulate in the rules how the credit (and in case of non-success, the blame), is to be divided between the manufacturers of the tires and the vehicle.—ED.]

Ignition Queries—The Bowden Wire.

Editor HORSELESS AGE:

Your foreign correspondent, describing the Crystal Palace Show, mentions one firm which spark their two cylinders with one coil, a spark occurring in both cylinders at every sparking moment, and states that several makers are adopting the practice of making a second break in the circuit outside of the plug that is firing. Will you kindly explain fully the object of this second break?

We have had it drummed into us that it is a hard enough proposition to bridge the one gap of the plug, and that where two cylinders are sparked simultaneously, one spark occurring in compressed gas and the other in exhaust products, the former spark (which is the only necessary one) will be greatly weakened. Please go into this thoroughly. Also what is the Bowden wire mentioned in several plans?

ARTHUR M. TOWNSEND.

[In regard to the double spark see article by Mr. Clough in this issue, and also editorial on this subject. Bowden wire is more fully described in the article, "Steam Cars at the Crystal Palace Show," in this issue. This should find a place in the American market.—ED.]

Lubrication and Lubricators.*

BY THOMAS CLARKSON.

To appreciate lubrication we may with advantage first study the enemy—"friction." Its laws are few and simple, and may be divided into two classes—static and dynamic. The first deals with the friction of rest, and is given by some the not inappropriate name of "stiction" (belts and friction clutches come under this heading). The second deals with the friction of motion. It is with this class that we are more particularly concerned.

The friction of motion may be so subdivided into rolling and sliding friction. The former relates to ball and roller bearings, the latter to plain bearings.

In rolling friction the balls or rollers act in a manner closely analogous to the lubricating medium of a plain bearing by keeping the working surfaces apart. If it were possible to make a ball or roller bearing with absolutely no sliding friction, the use of a fluid lubricant might be safely dispensed with; but there is sliding between the balls or rollers themselves, or between them and the cage employed to keep them in position. The amount of sliding friction is lessened when intermediate balls or rollers are used; but it is not entirely eliminated. The extra complication and cost of these bearings qualify their other advantages, and the friction of a well designed plain bearing, properly lubricated and protected, is very much smaller than many people imagine.

The amount of friction between two surfaces sliding together depends upon several things: 1, pressure applied to them; 2, the material of the surfaces; 3, their smoothness and hardness; 4, their wetness and dryness; 5, their temperature; 6, the viscosity of the lubricating medium.

The cause of friction and the reason why two bodies touching each other offer resistance to relative motion appears to be that the touching surfaces interpenetrate and interlock. The extent depends upon the degree of roughness or polish, and

* A paper read before the A. C. G. B. and I. on January 30 (slightly condensed).

upon the faculty possessed by one of the substances to mold and adapt its surface to correspond closely to the microscopic configuration of the other. I refer to substances possessing plastic properties, such as leather, fibre, rubber and the like. To reduce friction to its lowest degree, it is clear that the surfaces must be as smooth as possible, and that at least one of them should be capable of the highest polish. The degree of polish depends largely upon the hardness of the substance—hence the suitability of case hardened steel for motion pins and valve mechanism. The surface burnishes like a mirror, and gives its mate no chance of becoming too intimate.

Although the amount of friction is generally stated to be independent of the extent of surface in contact, for practical reasons this old law needs qualification.

If the surface is large, the pressure per unit area is correspondingly small, and may be quite insufficient to squeeze out the film of lubricant—hence the active surfaces are kept at a respectful distance. But with relatively small wearing surfaces, the pressure on the lubricant is proportionately greater. The surfaces possess a more penetrative power, which—if it cannot be checked—will squeeze out the lubricant, and permit physical contact. This may become so intimate as to start the force of cohesion, with "scoring," or tearing of the surfaces, as an immediate result.

The principal object of lubrication is to prevent such a result.

It must not be expected that lubrication alone, however perfect, will make up for errors of design in making the surfaces too small for the work they have to do; but it is possible for a well lubricated machine of inferior design to do more useful work than an otherwise more perfectly designed machine in which lubrication is defective.

Indeed, lubrication is of such primary importance that a machine with defective lubrication, however perfect otherwise, cannot be described as well made. This applies with special force to an automobile, and investigation of this point will well repay an intending buyer.

Another important condition to smoothness of working is to keep out intruders. The lubricant should be clean and free from solid substances. This medium is the only thing that should be permitted to come between the working surfaces. If particles of dust or grit are permitted, their smallness of area and consequent penetration enable them to cut through the film of lubricant, to the detriment of the working surfaces; therefore, intruders must be kept out.

LUBRICATORS.

Next, as to the means of securing the most reliable lubrication with the smallest attention on the part of the driver.

A lubricator consists of a reservoir and one or more feeders. It may be portable, as in the old fashioned oil can, which is perhaps the most elementary form of lubricator. Usually, the lubricator is fixed close to the bearing it is to serve, or, should this be inaccessible, it may be fixed at a distance, and a connecting pipe used.

The use of an oil can is extremely wasteful in lubricant, and should the interval between successive feedings be too long, permanent injury to the bearing is likely to result.

The same general conclusion applies to all devices which depend for their action upon human adjustment and attention; and I have no hesitation in affirming that to expect a driver to regularly fill and periodically inspect and adjust a lot of lubricators in a car is highly unreasonable and foolish. Even with a careful driver some may be overlooked—or in the act of filling foreign substances may get in—besides, the filling operation is messy and disagreeable, and, therefore, likely to be postponed unduly. In preparing a car for service attention to lubricators forms no small part; and could this be entirely done away with the time would be shortened and the pleasure of using a motor greatly increased.

Speaking broadly, there are two systems of lubricating a bearing. In the first the rate of feeding is adjusted as far as practicable to the actual requirements. In the second the bearing is liberally flooded, and the large surplus recovered for use again.

It would not serve my purpose to attempt to describe the innumerable forms of lubricators which come under the first category, all of which depend individually for their action upon human adjustment, since I am entirely opposed to such human adjustment and individual inspection. The long rows of sight feed drips which are sometimes seen on a dashboard are veritable instruments of torture, and it is perfectly unreasonable to expect the driver to look at them. With such an instrument the poor driver is between Scylla and Charybdis—either he must largely overfeed or risk a stoppage and a ruined bearing.

The quantity of good oil necessary to maintain a film between the working faces of a well constructed bearing is really very small indeed. To approximate the rate of feed to this small quantity means a very small drip outlet; and a very small drip outlet means that a tiny particle of dirt or extra thick oil will stop the supply altogether.

To avoid this the feed is habitually extravagant, and the cost for wasted lubricating oil may easily be ten or more times of what is actually used.

The system of liberally flooding the bearings and recovering the surplus implies that all the bearings are effectively enclosed, not merely to exclude dust (which is a good thing in itself), but to catch the surplus oil and collect it in a common reservoir.

The oil may be supplied to the bearings either by the splashing of the mechanism in a bath of oil, or the oil may be pumped over the bearings. Both ways have the advantage of starting and stopping the lubrication simultaneously with the running of the machinery, and without the intervention of the driver, which is a correct principle. The waste of oil is extremely small (if the case is made properly), and consequently the best quality does not become an expensive item, when 1 gallon will last for 1,000 miles.

Splash lubrication answers well in some cases, where all of the bearings are in a position to benefit by the splash distribution; but this is not always the case, and the violent agitation of the body of oil tends to preserve in suspension any fine solid particles, either of dirt or metal, which should be allowed to settle.

For the above reasons I advocate pumping the oil under pressure. A force pump working under the extremely favorable conditions of dealing with lubricating oil will run for years without attention; and its action may be instantly tested at any time when running by momentarily pressing a button.

The next step is to insure that the oil which is pumped is going to all of the bearings. On an automobile I do not advocate a separate pump for each bearing. One pump for all the bearings is enough, only we must be sure they all get a proper share.

One arrangement is for the pump to deliver the oil into a distributing main, fitted with branch pipes, which connect with the several bearings. The objection to this is that some of the branch pipes may become fouled after prolonged use, and the rest of the branches will obligingly take their brother's share. (See Fig. 1.) Or, if some of the branch pipes are longer than others—which is practically inevitable—the short ones take more oil than the longer ones. This means that the circulation in the larger pipes is less vigorous, and this is the first step to becoming sluggish, and finally stopping altogether.

Such an attempt at equal sharing or communism must fail, and I can only see one effectual remedy for it, namely, to compel each of the branch tubes in turn to take the whole of the oil delivery for a fraction of the time, instead of attempting to take a fraction of the delivery all the time.

From this conclusion—which, it will be

FIG. 1.

ofesses nothing more than ordi-
mmon sense—it is a short step
ruct such a distributer.
shows a distributer which I have
answer perfectly and give no
The oil is delivered by the pump
pipe A, and fills the box B; the
lets are the ring of holes C, each
h communicates with a bearing.

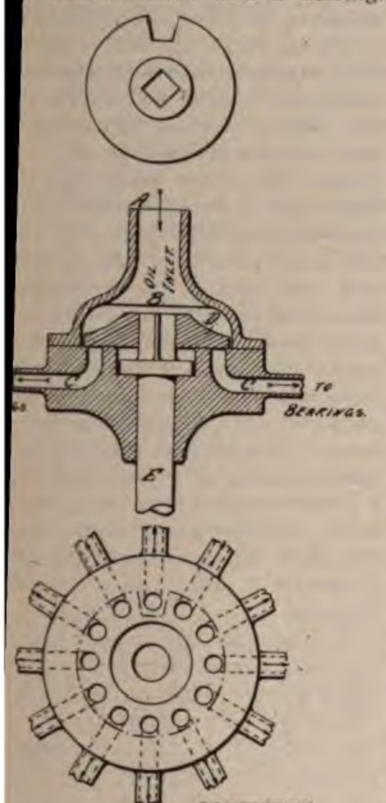


FIG. 2.

ng of holes is covered by a circular
, which is slowly revolved by the
On one side of the disk a seg-
cut out so as to uncover one hole
ne, and the desired result is accom-
. Care is taken to make the seg-
wide enough to partially open the
ole before closing the last. Any
of branches may be used.
arrangement works perfectly; it
er given the slightest trouble since
made. After running over 3,000
Chelmsford engine fitted with it
ken to pieces and examined. The
ption of lubricating oil is very
and the relief from attention to
ors has added a great charm to
The oil is strained each time it
es, and any solid particles are per-
to quietly settle to the bottom of
well, where they can do no harm.
n tap is provided at the lowest
and replenishing is done through
inspection hole in the top of the
case.
not necessary to carry a reserve of
ing oil, or even an oil can, except
ring and brake motions. One fill-
the well (say a gallon) will last
thousand miles on a large car.
ame system, with modifications, is
le to cylinder lubrication.

The lubrication of outside driving chains has special difficulties, owing to the exposed situation and the impracticability of properly enclosing them.* They work remarkably well, considering their dirty and generally neglected condition; and an occasional bath in parafine and a subsequent soak in a melted compound of fat and graphite does fairly well.

Danger Points in Automobiling.

At the Tuesday evening (Feb. 17) meeting of the A. C. A. experiences on the road were related by members, the theme being "Danger Points in Automobiling." President A. R. Shattuck recommonded moderate speed, a readiness with the clutch lever and brake and a wary lookout as preventives to accidents. Considerable of the talk turned upon the mishaps due to punctured tires and skidding. George B. Adams told how, through the wheels skidding, his car had overturned and thrown him out. James McNaughton said that when he was approaching from behind a buggy containing two women and a big basket of eggs, the horse drawing the buggy suddenly stopped, and his car hit the buggy and threw the women and the eggs into a ditch in one heterogeneous mess. E. E. Britton narrated how he and his chauffeur had run over the hat of a drunken man lying across the road and missed his head by a few inches. He also told how to subdue frightened horses by trainers' methods. C. J. Glidden recounted how he climbed St. Gothard, starting in a temperature of 75° and reaching one of 28°. He carried wooden blocks with which he chocked his wheels to keep from sliding backward when he stopped, as he always did, to let a diligence or other vehicle go past, and he always took the side of the road next to the precipice to keep the horses on the safer side. Emerson Brooks told of a narrow escape from a crash with a trolley car. E. B. Gallcher said the danger is more a question of the man who was operating than it is one of speed, and he eulogized Fournier as a safe and skillful chauffeur. President Shattuck said that fast driving was the greatest danger and that he never crossed a railroad track without having a good look up and down the line. If trees obstructed the view he stopped before crossing, and usually slowed anyhow.

Experiences were also given by John Brisben Walker and J. A. Hill.

At a recent meeting of the American Automobile Association, of New York, the proposition to extend the scope of the organization by accepting individual memberships, which was introduced at the annual meeting last month, was seriously considered and the secretary was instructed to consult with certain members and report upon the necessary amendments to the constitution that will enable the association to admit individuals and maintain a proper balance between them and the clubs in the way of voting power.

...OUR... FOREIGN EXCHANGES

The Tire Trials of the A. C. G. B. and I.

The judges appointed by the committee of the Automobile Club of Great Britain and Ireland, in connection with the tire trials last fall, have just handed in their final report, which appears in extenso in the *Automobile Club Journal* of January 29.

A sub-committee of the executive committee of the club was appointed on May 5, 1902, to organize a trial of motor vehicle tires, and this committee held its first meeting on May 29, 1902, at which meeting the conditions of the trial were drafted. The conditions were in part as follows:

Three kinds of motor vehicle tires would be admitted to the trials, viz.: pneumatic tires, hollow tires, but not inflated, and solid rubber tires. The distance of the trials was to be 3,000 miles, with the option of extension at the judges' discretion; distances of 100 to 150 miles were to be made each day for five or six consecutive days in four consecutive weeks. The route was to begin and end each day near the clubhouse, with the exception of the first week, when the runs were to begin and end at the Crystal Palace, this week being that of the 650 mile reliability trials. The maximum speed was to be as in the Glasgow trial and the minimum speed in the open country an average of 12 miles per hour. Seats were to be provided on each car for one official observer and for one competitors' observer. Both official observers and competitors' observers were to change cars during the trial, the official observers each day.

The tires for the trial were to be selected out of stock by a representative of the judges' committee. At the end of the trial the tires run were to become the property of the club, in order that they might be cut for examination, and a section of a similar tire was to be supplied to the committee before the trial.

The entry fee was fixed at £21 per set, and any balance of receipts over expenditures was to be returned proportionally to the competitors. In judging the performances of the various tires, the following factors were to be taken into account: one mark to be deducted for every minute spent in tire inflation or repair, whether in the control or on the road; price of tires; loss of weight; condition as shown by periodical examination and photographs taken during the trial. The cars were of course stored under club supervision.

At a meeting on June 2, 1902, the executive committee of the club appointed the following judges of the trial: Prof. H. S. Hele-Shaw, Lt. Col. H. C. L. Holden, Maj. F. Lindsay Lloyd and Capt. C.

H. H. Nugent. The following prizes were offered by Alfred Harmsworth, to be known as the *Daily Mail* prizes: First prize, £100; second prize, £50, and a third prize of £10 for up to ten sets of tires which might satisfactorily complete the trial and be next in order of merit.

The assistant secretary of the club toward the end of August proceeded to the various manufacturers who had entered tires to select the outer covers from the ordinary stock, viz., four per car and two in reserve. With two exceptions the stock submitted to select from was considered too small, and specially qualified receipts for the tires taken over were given, making mention of the fact that the preliminary condition that the stock should consist of at least forty-eight tires had not been complied with.

The covers selected were provisionally marked at the warehouses and subsequently specially branded, and during the trial they were kept under observation by day and night. Special lockup stores were provided, the only existing key to which was kept in the custody of the club.

Of the twelve sets entered for the competition only ten arrived at the Crystal Palace when the contest began, the absentees being the larger sizes entered by the Martin Syndicate and the Goodyear Company, designated as "T9" and "T11" respectively. At the end of the first week, during which the 650 miles of the Reliability Trials had been covered, the average and worst portions of the front and hind covers were photographed; photographs were again taken at the end of the third week, when some of the cars had traveled about 2,185 miles, and again on completion of the full 4,000 miles. These photographs have been mounted in a special album and are preserved together with sections cut from each of the competing tires, to enable members of the club who have purchased tires of similar manufacture to satisfy themselves whether their purchases are identical with the tires submitted for the trial.

From August 29 to September 8 the Crystal Palace served as garage, and from September 8 to October 15 the Mayfair Garage was used. Special attendants were employed by day and night for the purpose of guarding the cars and taking note of any repairs effected. During the first week the daily runs coincided with those of the 650 mile Reliability Trial, averaging 145 miles per day over some of the most trying roads within a radius of 75 miles from London. The cars ran on five days of each week, being started at 8 o'clock every morning by the assistant secretary. The Saturdays and Sundays were days of rest for the drivers and observers.

To avoid excessive speed, the daily journeys were divided into stages and a minimum time fixed for each of these stages, and as a result not a single case of police prosecution occurred.

Of the ten sets of tires which commenced the trial only the following six sets succeeded in completing the 4,000 mile road test: the four sets entered by the Dunlop Pneumatic Tire Company (Nos. T1, T2, T3 and T4); one of two sets entered by the Maison Talbot (No. T6), and the set entered by the Collier Tire Company (No. T7). One of the competitors asked to be permitted to run the car to which his tires were attached over a special piece of road covered with broken flints, broken glass, etc. The judges agreed to allow this additional test after the completion of the trials, but as this particular competitor failed to complete the 4,000 miles, this test did never take place.

The judges based their awards on the conditions mentioned at the beginning of this article, but decided that it was absolutely necessary, before arriving at a conclusion, that the competing tires should be tested with a view to ascertain how far they possessed the properties which give the pneumatic tire the preference over the solid tire. For this reason tests were made on the speed and resiliency of the tires by Prof. Hele-Shaw with the British Association's apparatus. In regard to time spent upon inflation, the Collier tires (T7) lost fewer marks than any others, only one tube being punctured and there being no need to change an outer cover. The damaged tube was replaced with another with a loss of only 26 marks, and the total deduction during the trial was 48 marks. The Dunlop set No. T2 also completed the 4,000 miles without changing a cover, but had two punctures. The company's representative put his tire lever through the inner tube when refitting and mislaid the pump connection, thus occupying 39 minutes. When the other puncture occurred a new tube was fitted to the hind off wheel in 11 minutes 50 seconds, thus bringing up the total loss of marks for inflation and repair to 87. None of the other competitors finished the 4,000 miles without change of covers, the Dunlop cars Nos. T1, T3 and T4 having recourse each to a reserve cover, while the Maison Talbot (T6) used both reserve covers and also refitted a cover which had been repaired in the garage. Neither the Goodyear, Martin nor Midgley sets completed the trial.

The judges were not able to definitely establish any variations in the weights of the tires during the trials by which one tire could be adjudged superior to another. The trials for facility of detachment showed that such tires as were tried for detachability, viz., T1, Dunlop; T2, Dunlop; T3, Dunlop; T4, Dunlop; T6, Maison Talbot; T7, Collier, and T12, Midgley, were removed with reasonable facility. The Collier tire (T7), which is attached with twenty-four bolts, from each of which a nut and washer had to be removed, necessarily took somewhat longer than the other tires, which merely depended upon bolts and inflation. extra thickness and rigidity of the cover also made it somewhat mor cult to manipulate. In the opinion judges, the multiplicity of iron an bolts and nuts (which are liable t rosion and rusting tight) is not de for the attachment of a tire. The had no opportunity of testing the ability of the Goodyear and Marti which had previously been withdraw from certain incidents during the would appear that the Martin tire not fairly be termed "detachable" term is ordinarily understood.

Prof. Hele-Shaw made resilienc other tests with the British Asso dynamometer, not only with tire had been through the 4,000 miles b with new wires of the same make from the reserves of T2 and T7 resp ly. These tests clearly showed t similar conditions of speed and roa face the Collier tire required an of power over the Dunlop tire v from 15 to 30 per cent., and th greater excess of power was requi a lower speed. They also showe more vibration was communicated the road surface to the structur ported by the wheels when the Coll was used.

In their report the judges made t lowing recommendations as to a The first prize of £100 to be awarded set of tires T2 entered by the I Pneumatic Tire Company; the prize of £50 to be awarded to the set T7, entered by the Collier Tire Co and third prizes of £10 to be awar each of the remaining four sets wh adjudged to have satisfactorily con the 4,000 mile road test and are opinion of the judges in order of m follows: T1, entered by Dunlop matic Tire Company; T3, enter Dunlop Company; T4, entered by I Company, and T6, entered by the Talbot Tire Syndicate.

According to a speaker at the rec nual dinner of the West End Forem ors' Society at the Hotel Cecil, Lond West End firms nearly all refused to nize that making motor clothing branch of the trade. French, and m pecially German, firms had not been seize such a neglected opportunity, a now nearly the whole of the trade in garments in their own hands. T English firms engaged in this depa were nearly all tarpaulin manufa who could hardly be expected to t the same fit as an experienced tailor.

At the opening of the cycle and a bile show in Liverpool, England, on ary 3, Sir Alfred Jones alluded to portance of a great city like Liverp veloping motors for commercial p In order to give some local encoura to effecting improvements he offere

guinea cup for the best improvements in motors for commercial purposes and a 20 guinea cup for the best pleasure motor car made locally.

During the railroad strike in Holland newspapers are being transported to country towns by means of automobiles, with much success, according to reports.

A correspondent writes to an English contemporary: "One curious result of a car case, in which I was fined £10 for 'scorching,' is that in less than a week I have received upward of seventy begging letters from charitable societies or individual beggars. Motor owner and millionaire are apparently one and the same thing in the popular mind."

There will be an automobile parade at the opening of the automobile show in the Floral Gardens in Berlin on March 7. On the night of the opening day all automobilists allied with the German Automobile Union will move in parade line from the Floral Gardens to the Royal Palace. Electric and torchlight illuminations will be used to make the parade picturesque.

The committee of the A. C. G. B. and I. on the side slip problem has decided to hold a preliminary test to eliminate devices unworthy of further trial. Those that survive will be tried on a private track prepared with a coating of slippery clay, and sharp bends will have to be made by the competitors. A further test will consist of long runs on limestone and other naturally greasy roads in suitable weather.

An appeal has been issued to the members of the Automobile Club of Great Britain and Ireland by its executive committee for subscriptions to a fund for the improvement of the Irish roads over which it is hoped that the Gordon Bennett cup race will be decided next summer. It is calculated that the necessary improvements can be effected at a cost of about £10 per mile. It has been arranged that members of the race committee of the club shall visit Ireland about the end of April and shall proceed on motor cars over the course with the county surveyors.

The show question in England seems to become rather acute. The management of the Crystal Palace Show have issued a document forming an agreement between members of the Society of Motor Manufacturers and Traders, Limited, and the management of the Show, by which the former agree to exhibit at no other than the Crystal Palace Show. To this document a bond is attached which the members are asked to sign. The rival trade organization, the Automobile Mutual Protection Association, Limited, has now issued a warning against signing this bond.

An automobile club has been formed at Magdeburg, Germany, with an initial membership of twenty-one.

Mme. Lockert, proprietress of *Le Chauffeur*, has entered for the Paris-Madrid race with a 22 horse power Ader car.

A movement is on foot in Paris to start a separate club for motor cyclists, it being urged that the present A. C. only looks after the interests of members who own cars.

The Frankfort Automobile Club, of Frankfort-on-the-Main, Germany, will hold its annual international automobile races on August 30 next, on the track of the Frankfort Race Club.

At the Crystal Palace Show out of 441 cars exhibited 193 had live axles and wood wheels, 55 live axles and wire wheels, 192 fixed axles and wood wheels and onlly one a fixed axle and wire wheels.

Australia's great annual cycling carnival, the "Austral," was enlivened by its first motor bicycle race on a grass track. The winner was H. B. James, on a machine built by E. Beauchamp, of Prahran, Victoria.

The 1903 Mercedes touring car has a wheel base of 92 inches and weighs complete without supplies 2,280 pounds. The motor is a four cylinder, 4.4x5.6 inches, running normally at 1,000 revolutions per minute.

The Scottish Automobile Club will in future hold 100 mile trials on the lines of those conducted by the A. C. G. B. I. Only the legal speed limit will be recognized, except on a certain hill, the run up which will be treated as a hill climbing trial.

The Oldsmobile Company of Great Britain, Ltd., have changed their name, and will in future be known as the Anglo-American Motor Car Company, Ltd. They have the exclusive agency in Great Britain for the Oldsmobile, Winton, Baker Electric, and Vehicle Equipment Company.

The Italian Ministry of the Interior has just published statistics relating to automobiles in 1902, dealing with owners who have paid the tax imposed. Accordingly there is a total of 1,472 automobiles, distributed in the following manner among the various provinces: Turin, 261; Milan, 183; Rome, 126; Padua, 98; Florence, 84; Genoa, 77; Bologna, 61; Novarra, 48; Cremona, 32; Naples, 29; Palermo, 18; Catalonia, 14, etc.

A meeting of British motor cycle traders was to be held at the Automobile Club during the week following the Crystal Palace Show to enable the trade to elect their own representatives on the organizing committee of the reliability trials for motor cycles fixed to take place in August next.

S. F. Edge has accepted the presidency of the Motor Cycling Club, of London.

In connection with an exhibition to be held at Udine, Italy, in August next, a race is being planned over a circular route of 300 kilometres, starting and ending at Udine.

The Mid-European Association of Automobile Drivers has been formed in Berlin and meetings are to be held the 1st and 15th of each month. Carl Schultz is president of the association and Hans Ernecke secretary.

On Friday, January 23, an outbreak of fire occurred in the paint shop of the Wolseley Tool and Motor Car Company, Ltd., Adderley Park, Birmingham. The place was full of carriage bodies being got ready for exhibition, and only the promptitude of the works' staff prevented serious consequences.

Chicago Good Roads Convention.

The National Good Roads Convention took place at the Auditorium in Chicago on the evening of February 20. Col. Albert A. Pope, of Boston, was made president of the convention and a committee was appointed to draft resolutions to be presented to Congress with the recommendation that these resolutions be acted upon at the earliest possible date. This committee was composed of Col. Frank O. Lowden, Col. Albert A. Pope, of Boston, and William H. Moore, of Chicago. The resolutions adopted are as follows:

Whereas, The annual loss to the nation through bad roads, amounting to hundreds of millions, constitutes today the most important economic question before the American people, and

Whereas, It is inevitable that the rural free postal delivery will soon be universal in this country, and that these deliveries will necessitate the best of public highways, therefore, be it

Resolved, That the Senate and House of Representatives be petitioned by this convention for an appropriation of $20,000,000 for highway construction, to be assigned to the several States and Territories which shall appropriate amounts equal to their assignments. This in order that each State and Territory shall have examples of the best roadway constructed under the supervision of government engineers.

Resolved, That this convention commend to the country at large the example of Massachusetts, Connecticut, New York and New Jersey in their rapid progress toward scientifically constructed highways, in appropriating large sums upon conditions that counties and towns shall contribute like amounts—one-third by State aid, one-third

by the counties, and one-third by the localities benefited.

The convention was attended by delegates from about thirty different States and although the large hall was not quite filled, it was still a large meeting. The convention was called to order by John Brisben Walker, of New York, who in a brief address called attention to the notoriously bad streets of Chicago, which he said made the city a particularly appropriate place to hold a good roads convention in. He also presented some figures intended to show the loss occasioned annually by bad roads throughout the country.

Col. Pope spoke at considerable length upon the urgent need of good roads. Good roads, he said, were an important factor in civilization. When the movement has once begun in earnest it cannot be stopped. In Massachusetts it has reached a very advanced state and its progress there will not be checked. The farmers had been opposed to it at first, but were now most enthusiastic in its favor.

Another speaker was Martin B. Dodge, of the United States Department of Agriculture, who urged co-operation between the National Government, the State and the agriculturist. He expressed the belief that the wisest plan would be to establish a general fund for the purpose from these sources. "It is impossible for us to proceed successfully without some such plan," he continued. "As long as you put the entire burden on the agriculturist he is unwilling to carry it. I believe we are losing time now, because we do not ask our representatives to provide as they would be willing to provide if you would make the request."

Col. W. L. Dickinson, of Massachusetts, also made a strong plea for good roads, as did also H. S. Earle, of Michigan, and several others.

MINOR MENTION

Automobile owners of Kankakee, Ill., will form a club.

George F. Keep has purchased an automobile repair shop at Waltham, Mass.

Lane & Lay, Kalamazoo, Mich., are promoting a company to build automobiles.

Alden Sampson, Pittsfield, Mass., will engage in the manufacture of touring automobiles.

John Wanamaker has secured the New York agency for the Studebaker automobiles.

The Roe Automobile Company, Buffalo, N. Y., has been incorporated, with a capital of $10,000.

Washington, D. C., will hold its third annual automobile show during the week of March 23 to 28.

John J. Gibson, of the Buffalo (N. Y.) Automobile Exchange, recently purchased the property at 401 Franklin street for a garage and repair station. He will also handle the Haynes-Apperson gasoline carriages.

The Board of Police Commissioners of Norfolk, Va., are reported to be considering the purchase of an automobile patrol wagon for $2,000.

A. W. Norris is at the head of a new agency which is to handle the Autocar, Olds, Knox and Packard machines in Saginaw, Mich.

Four additional stories will be built on the automobile store of William E. Metzger, Detroit, Mich. Mr. Metzger will occupy the first four stories.

The educational department of the Young Men's Christian Association of Minneapolis, Minn., has included in its curriculum a course of sixteen lectures on gasoline automobiles and motors.

Major George C. Gibbs, Stamford, N. Y., is talking up a scheme to raise $4,000 to establish a line of automobiles to carry passengers from the railroad depot to the different hotels during the summer.

Claude Cox, superintendent of the automobile shops of the Standard Wheel Company, Terre Haute, Ind., has perfected a new model auto. The machine has a long wheel base and is propelled by a gasoline engine.

The Imperial Transit Company will be incorporated with a capital of $300,000 to run a line of auto buses in Detroit, Mich. The same people are said to be interested as are interested in the Imperial Automobile Company, with a capital of $250,000.

The Long Island Automobile Club, Brooklyn, N. Y., is planning to have a 100 mile race on a course 50 miles long, such as is to be found on Long Island. The officials of the club are now at work seeking to obtain the necessary permission.

Dr. Ashley Webber, an enthusiastic automobilist and a contributor to our Doctors' Number, suddenly died at his home in Williamsburg, N. Y., on February 19, of Bright's disease. Dr. Webber was the champion revolver shot of the world.

The Packard Motor Car Company inform us that William Rockefeller recently bought one of their new four cylinder touring cars, with special body design, for $8,160. This is said to be the ninth Packard machine bought by Mr. Rockefeller.

A company is to be organized at Springfield, Ohio, to manufacture automobiles, and two models are being built now by A. S. Krotz at the former plant of the Whitely Manufacturing Company. One of the vehicles is to be equipped with the Edison storage battery.

The Gas Belt Automobile Club, Muncie, Ind., has been organized with the following named directors: F. C. Ball, W. R. Moore, H. C. R. Wall, Jesse Stephens, Al. Bingham, F. W. Warner and G. A. McClellan. The officers are: F. C. Ball, president; G. A. McClellan, vice president, and H. C. R. Wall, secretary and treasurer.

The Berkshire Automobile Club, Pittsfield, Mass., has leased three rooms in the Whelden Block, situated just in front of the Central Automobile Station. They will be handsomely furnished with everything up to date. Nine new members were elected at the last meeting and several new machines will be added early in the season.

The Gibbs Engineering and Manufacturing Company, Corning, N. Y., has been incorporated to manufacture motors and machinery, in connection with self propelling vehicles, engines, car trucks, etc; capital, $1,000,000, and directors, Samuel Riker, Jr., Percy J. Fuller and Charles M. Kirby, all of New York.

W. J. Arkell, New York, is contemplating the erection of a large building on the site of the Durland Riding Academy, on Fifty-ninth street, several floors of which will be devoted to automobiles, a repair shop in the basement, a garage on the first, a permanent show and salesroom on the second and clubrooms on the third.

The Nelson Gas Engine and Automobile Company has been formed at Harlan, Ia. Principal stockholders are T. K. Nelson, W. M. Lana and S. G. Dunmore, of whom Mr. Nelson is president, Mr. Lana vice president and Mr. Dunmore secretary and treasurer. The company has a capital of $10,000, but is authorized to increase it to $50,000.

The Cleveland (Ohio) Automobile Club will probably have a new clubhouse in the near future. The preliminary steps to this end were taken at the club's annual meeting on February 10. E. Schriver Reese, Fred T. Sholes, George Collister and Windsor T. White were elected president, vice president, secretary, and treasurer respectively.

At the last regular monthly meeting of the New York Motor Cycle Club it was decided to give gold medals to all members who score at least 3,000 miles between March 1 and December 1. President E. J. Willis also duplicated his award of last year of a gold club pin to the member attending the greatest number of regular called runs.

Moses Fifield has been elected assistant secretary of the Rhode Island Automobile Club in place of Benjamin S. Clark, resigned. F. C. Fletcher, R. Lincoln Lippitt and C. Prescott Knight, the committee appointed to make arrangements for a club station, have closed negotiations with the Columbia Automobile Garage to be the official station of the club.

Overtures have been made to the Hudson (N. J.) freeholders for the purchase of the old Belleville turnpike across the Kearny Meadows by a number of wealthy automobilists residing in Newark, Montclair, Bloomfield and other towns. If the road cannot be bought, the freeholders and State road commissioners, who now have under consideration plans for the improvement of the old highway, will be urged to alter the pending plans and have the macadamizing laid to a greater width than the 20 feet now contemplated, so as to make a more suitable road for automobiling.

LEGISLATIVE AND LEGAL.

Automobile Legislation in Cincinnati.

The Automobile Club of Cincinnati is taking steps to have an ordinance passed regulating the use of automobiles in Cincinnati, and Col. Max Fleischman, acting for the club, has recently handed to Vice Mayor Christie copies of ordinances which have been passed by other cities. The best parts of these will be taken and incorporated in an ordinance which will be handed to the board of legislation, with a request from the club for its passage.

Each owner of an automobile will be compelled to register with the city auditor his name and the number of automobiles he owns, and a license will be issued. The auditor will issue an ornamental tag of some kind, probably one with the initials of the owner of the automobile. There will also be a regulation as to speed, but just what limit will be asked by the club has not yet been decided.

Automobiling has become so popular—there are over 100 devotees in Cincinnati—that the club has come to the conclusion the city should take a hand in the regulation of their use. As the city would have doubtless done this anyhow in the near future, the club decided that if they could secure the passage of an ordinance drawn up under their supervision it would be far less likely to be detrimental to the use of automobiles than if left to some ignorant legislator to draft and bring before the board for passage.

Auto Legislation in New Hampshire.

There are at present five bills before the New Hampshire State Legislature proposing to regulate automobile traffic in the State.

House Bill No. 4, introduced by Mr. Howe, of Hanover, contains the following provisions: Speed limit outside of cities and towns, 15 miles per hour, and within cities and towns, 6 miles an hour. Speed must be reduced when meeting horses and the vehicle be stopped altogether upon signal of the horse driver. Upon approaching crossings and traversing same speed must be reduced below that specified above, and must not be greater than what is reasonable and proper, having regard to the traffic. Violations of this bill are punishable with a fine not exceeding $100 or imprisonment not exceeding fifteen days, or by both.

House Bill No. 37 introduced by Mr. Churchill, of Cornish, provides that the speed limit in the country shall be 15 miles an hour and within cities and towns 10 miles an hour. In meeting horses the operator must use every care to prevent accident, and when requested by signal of the driver of the horses, he must not proceed farther towards the animal unless necessary to avoid accident or until the animal appears to be under control. On approaching crossings the speed must be reduced below that specified above and must not be greater than is reasonable and proper, having regard to the traffic on the road. Penalties for violation, fine not exceeding $100 or imprisonment for a term not exceeding fifteen days, or both.

House Bill No. 101, introduced by Mr. Severance, of Exeter, limits speed to 10 and 15 miles in town and country respectively. Speed on crossings must also be reduced and the rules regarding conduct when meeting frightened horses are the same as in the other bills. This bill also provides that every operator shall obtain a certificate from a reliable mechanical engineer, whose qualifications shall be first approved by the selectmen of the town or by the mayor of the city in which he resides, that he is competent to have the charge of an automobile upon the public streets. Every automobile shall be conspicuously numbered and the number together with the name of the owner shall be recorded in the office of the town clerk in the place in which the owner resides. The penalty for violations shall consist in a fine not exceeding $300 or imprisonment for not more than thirty days, or both.

There are two other bills before the New Hampshire Legislature which are almost identical with that of Mr. Howe's, of Hanover. One allows speeds of 15 and 8 miles and the other of 12 and 8 miles.

New Jersey Automobile Law Compromised.

A compromise is reported to have been effected on the projected law regulating the licensing of automobilists in New Jersey. Assemblyman Scovel, who introduced the pending measure, held a conference on February 9 with Karl G. Roebling and John S. Broughton, representing the New Jersey Automobile Club, and the result was practically an agreement to have the committee which now has the custody of the Scovel bill report a substitute which will afford ample protection to the users of the public highways and not work hardship to the automobilists. The new bill is expected to go through the Legislature without opposition or amendment.

The compromise measure provides that on public highways in the built up portions of cities the rate of speed is not to exceed 10 and in rural districts 20 miles an hour. Physicians and surgeons, while actually going to or returning from professional calls, are not to be restricted to this speed when the emergency may require them to go at a faster rate.

Every operator of a motor vehicle shall, at the signal from a person riding or driving a restive horse or team, cause the motor to remain stationary so long as may be necessary to permit the team to pass.

Every resident of the State who owns a motor vehicle and every non-resident owner whose motor vehicle is driven in the State shall file in the office of the Secretary of State a statement containing the owner's name and address, together with a brief description of the character of the machine, and pay a registration fee of $1 for each vehicle. In return a certificate will be issued by the Secretary of State for each vehicle.

The owner must also have the initials of his name and the number of his license upon the back or side of each vehicle, so as to be plainly visible, the letters to be at least 3 and the number not less than 2 inches in height. Every motor vehicle will be required to carry from one hour after sunset until one hour before sunrise at least two white lights, visible at least 200 feet in front, and at least one red light, visible from rear. Every vehicle must also be provided with good brakes and suitable bell, horn or whistle.

By complying with these requirements the owners of motor vehicles are to have the same rights and privileges as are accorded to the owners and drivers of carriages propelled by horses. Automobilists cannot be prohibited from the use of any public streets, avenues, roads, driveways, parkways or other public place by any local regulation.

For violating any provisions of the act the offender will be fined $25, to be paid to the overseer of the poor. Justices of the peace, police magistrates and recorders shall have jurisdiction to try and punish all offenders. An appeal may be taken to the Court of Common Pleas.

Representative Lyon's bill limiting the speed of automobiles on the country roads of Illinois to 12 miles per hour has been reported favorably with a recommendation for passage in the House.

The fixtures of the Remington Automobile and Motor Company, Utica, N. Y., were sold on February 11 by L. N. Southworth, trustee in bankruptcy, and were purchased, with the exception of two automobiles and a few other things, by John B. Wild and W. H. Owen, stockholders, representing the reorganized company, which is to carry on the business. The amount realized was from $10,000 to $11,000. The two automobiles went to George Spaulding, who paid $175 for one and $30 for the other.

Assemblyman Cohn has introduced a bill in the New York Legislature requiring all owners of automobiles which they hire out in New York County to pay a license fee of $25 to the county clerk. It also fixes the rate at 25 cents a mile for carrying passengers within the borough and provides that before a motorman can operate a machine he must have been instructed by a manufacturer or constructor of automobiles, and that automobiles must be inspected by an examiner, who is to be appointed by the Mayor and who is to receive $1 from the owner for each machine inspected.

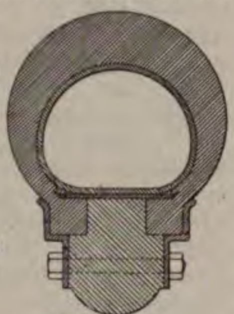
MOTOR VEHICLE PATENTS..

United States Patents.

720,639. Pneumatic Tire. — Francesco Toni, of London, England. February 17, 1903. Filed September 8, 1902.

The invention relates to a detachable tire

No. 720,550.



No. 720,639.

and particularly to a novel method of attaching the covers to the wheel rims. The edges of the cover are formed with enlarged heads of square cross section, composed of canvas and rubber. The wood felloe of the wheel is channeled at its outer edges to receive these heads, which are retained in place by annular rings on either side of the felloe, and a flat annular plate, the edges of which overhang the channels of the felloe and engage the top edges of the heads. This plate is permanently fixed to the wood felloe.

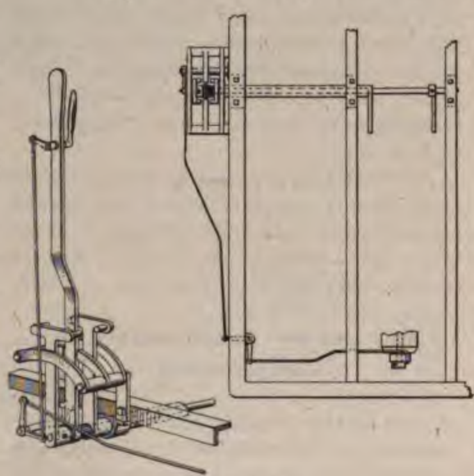
720,707. Condenser.—Frederick Lamplough, of London, England. February 17, 1903. Filed November 25, 1902.

The invention comprises a condenser for steam automobiles designed to condense, under ordinary conditions, all the steam passing therethrough, but to heat steam and to render it invisible under certain special conditions, such as hill climbing, and at the same time induce a stronger current of air which will add to the condensing effect. A number of closed, hollow disks are used with an opening at the top and bottom of each, the disks being fitted into top and bottom tubes and soldered into position. With a condenser formed of three rows of disks one of the top tubes is provided with a steam inlet and the other top tubes are connected with two of the lower tubes, so that steam entering the first top tube will pass down through the interior of the disk connected therewith into the lower tube, up through one of the risers and down through the interior of the other disks. Under ordinary conditions this will condense all the steam and the water will pass into the lower tube at the right, from which it will run through openings in the wall into an eduction hood. The condenser is slung beneath or in front of the car, so that the edges of the hollow disks face the direction in which the car travels.

The eduction hood, into which a great portion of the rear set of hollow disks passes, extends the whole length of the condenser. A great portion of the air which passes between the hollow disks flows into the eduction hood, this air thereby becoming heated. If any uncondensed steam passes through the openings of the tube into the eduction hood it mixes with this hot air and is rendered invisible.

721,066. Spark Advancing and Retarding Mechanism for Explosive Engines.—Louis P. Mooers, of Cleveland, Ohio. February 17, 1903. Filed December 9, 1901.

The ignition lever is pivoted to the



No. 721,066.

change gear lever at the upper end of the latter, so that the operator can control the ignition while his hand rests on the change gear lever. The ignition lever connects, of course, to the base of the trembler.

720,550. Electric Circuit and Polarity Indicator.—Vincent G. Apple, of Dayton, Ohio. February 17, 1903. Filed June 17, 1901.

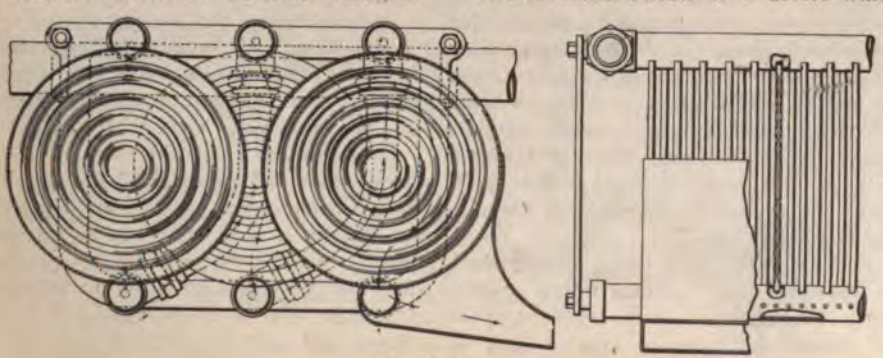
The invention relates to a device which when used for closing an electric will indicate that the circuit has bee and at the same time show the pol each of the two terminals. The dev sists of a block of insulating mat which is embodied a metal sleeve flanged at its upper end. In thi sleeve is arranged an inner case ad reciprocate in the sleeve and provid a glass top. The case contains a of iodide or bromide of soda or po and a little free alkaline. Through tom of the inner case passes an i screw, below which in the insulatin is another screw, connected by a one of two binding posts fastened insulating block. The other of the posts is connected to the metal slee current can flow through the liquid inner case is pressed down and the i screw in its bottom brought into with the screw directly below it. W circuit is thus closed the current, in through the liquid iodide, will de the liquid and liberate iodine at the pole. When the iodine is liber changes the liquid to a purple red the positive pole. After the curr ceased to flow the iodine is neutra the free alkaline and the liquid i rendered transparent. When it is n to pass a considerable current thro device, a wire coil forming a shunt is advantageously interposed between sulated screw and the wall of the case, as shown in the drawing.

720,652. Speed Regulator.—Vinc Apple, of Dayton, Ohio. February Filed May 13, 1901.

This speed regulator is intended ulating the speed of spark generator off the flywheel of gasoline engines at irregular speeds. Upon the shaf generator is mounted a tapered frictio the sleeve of the wheel sliding loo the shaft. To the shaft is also fixe lar and the collar and the frictio sleeve are connected by two pairs o at the joint of which centrifugal g weights are carried. A coiled spring shaft tends to force the friction whe from the fixed collar, while th trifugal force acting on the g weights has the effect of drawing t tion wheel toward the fixed collar. speed of the driving means should increase, the centrifugal force on t ernor weights will overcome the pre the spring and draw the friction wh of contact with the driving whee speed of the dynamo at once decrea centrifugal force on the governor is reduced and the spring again for friction wheel in contact with the wheel.

720,936. Steering Mechanism f hicles.—Fred A. Law, Hartford, February 17, 1903. Filed May 16,

720,967. Driving Gear for Auto —Edward Rawson, Moscow, Idaho ruary 17, 1903. Filed August 1, 19



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The Future of the Commercial Motor Vehicle.

"Will the motor wagon supplant the horse in delivery work and trucking?" is a question which has recently claimed considerable attention in automobile circles, especially in connection with the organization of the commercial vehicle trials by the Automobile Club of America. There was formerly no doubt on this point among devotees of this new form of locomotion, and that the question is raised now can only be explained on the assumption that the comparatively slow progress which is being made with commercial motor vehicles has influenced opinion regarding the ultimate commercial practicability of the automobile in this field. There is at present not one firm entering the manufacture of motor delivery wagons and trucks to a score entering the manufacture of pleasure automobiles.

The most apparent reason that can be advanced why the motor will supplant the horse in delivery work and in trucking is that it has already successfully supplanted him in many other lines. Street cars have been found very much cheaper to operate by mechanical motors than by horses; in lumbering districts the traction engine is largely employed for transportation purposes, and mechanical power is even employed to a considerable extent on the farm for purposes for which the horse was used formerly. Small gasoline motors are extensively used for pumping water, threshing machines are almost exclusively operated by portable steam engines, and on some of the large farms in the West the land is plowed by steam power.

In comparison with the motor, the horse is certainly at his best in agricultural work, for the farmer produces the horse feed himself, while he must purchase all the supplies for operating a mechanical motor. Farmers are naturally more or less expert in the care and treatment of horses, while they have, as a rule, no particular mechanical training. So that if the motor could successfully supplant the horse in the lines of agricultural work mentioned, the inference seems justified that it will quite easily be able to supplant him in the city, where all the conditions are in its favor.

One positive advantage of the motor wagon is that it is faster than the horse vehicle and will therefore admit of more prompt deliveries. Another undeniable advantage is that for a given working capacity it requires less stabling room than a horse and wagon, which is no small item in a large city where rents are high. However, the total cost of running and maintaining the vehicle is the factor which counts, and as soon as it can be positively demonstrated that this cost can be less than when horses are used, the introduction of the motor delivery wagon and motor truck will proceed very rapidly.

No particular effort has been expended so far toward producing a vehicle possessing the essential qualities of a delivery wagon. The efforts of designers have mostly been directed toward producing a vehicle of high speed and one that will stand up at a good speed—for a time. Considerable success has been attained in this line, as the results of recent contests show, but the experience of users and our own observation agree that all the present vehicles are subject to rapid wear. One designer brought out this point very clearly during the late endurance contest, when he said, with reference to present automobiles generally: "We now make automobiles that run nicely and reliably for some time after being placed in the hands of users, but it cannot be denied that after a year's use there is a great deal of wear in all the bearings, and the machine will rattle badly; the problem now is to build a machine that will run four or five years

before such signs of wear become apparent."

The present automobiles undoubtedly show more rapid wear than practically all other classes of machinery. The reason for this condition is a very simple one, viz., that all wearing surfaces are of scanty dimensions, and that the pressures on them are therefore far greater than are allowed in ordinary engineering practice. For instance, if one should apply the ordinary formulæ for the working strength of toothed steel gearing to the transmission gears of automobiles, these gears would seem much too small for the power rating of the motors. The case is similar with the bearings of cranks, etc. It has been necessary to reduce the dimensions of all wearing parts to secure the high speed capacity for which the public has been clamoring. With a delivery wagon, the maximum speed of which need not exceed 10 miles per hour, instead of 30 miles per hour, liberal wearing surfaces may be provided, and thus the most important cause of rapid depreciation removed. With low speed motors and lightly loaded transmissions it should be possible to construct motor wagons which will require very little attention in years, with the exception of the ordinary care required by any piece of machinery. And there is absolutely no doubt that the horse will be incapable of competing with such a machine.

Another factor which will favorably influence the practicability of commercial motor vehicles is that the present popularity of the pleasure automobile results in a large body of operators being trained in the handling of such vehicles, and that in consequence there will be less difficulty in the future in securing skilled drivers.

Good Roads Legislation.

It can hardly have escaped the attention of a careful observer that the good roads movement is progressing with leaps and bounds at present. Considerable headway is being made with road building under State laws in Massachusetts, New York and New Jersey, and while bills providing for national co-operation in road building are now pending in Congress, State aid in the construction and maintenance of public roads is at present being considered by many of the State legislatures. On another page of this issue will be found an abstract from a bill introduced in the Pennsylvania Legislature, by Senator Roberts, providing for an appropriation of $2,000,000 for the maintenance of the "stone roads" in the State. In reference to this bill we can only repeat what we recently said with regard to the Brownlow bill—that it should meet with the hearty support of the automobile interests, provided it makes it impossible for any part of the State to profit from it at the expense of another. The Roberts bill seems to closely resemble the road improvement laws now in effect in a number of Eastern States, except that it provides only for the maintenance of existing stone roads and not for the building of new ones. As the system of co-operation between the counties and the State is the same as that of the Higbie-Armstrong law, and the method of application for State aid similar, the Roberts bill seems to be an excellent measure to insure the improvement of highways, and to be deserving of the support of all automobilists.

Brush Storage Battery Patent Expires.

One of the most contested patents in the history of the United States Patent Office, issued to Charles F. Brush, of Cleveland, on March 3, 1886, and relating to storage batteries, expired yesterday. This patent, which broadly covered the construction of pasted plate storage batteries, has been the subject of many infringement suits, and injunctions have been granted under it only a few months ago. The validity of the patent was always upheld, and this practically established a monopoly in the pasted plate storage battery business.

The early expiration of the Brush patent has been made the most of by the manufacturers of electric vehicles for some time, particularly the manufacturers of electric business wagons, who expect a considerable reduction in the price of batteries after the field is thrown open. Of course, the pasted plate battery has so far had to compete with Planté batteries; but the latter are much more expensive to manufacture and require more special machinery for their construction. The greater cost of manufacture is at least partly compensated by a longer life of the Planté batteries; but as the latter weigh considerably more for a given capacity than pasted plate batteries it is not unlikely that some of the manufacturers of Planté type of batteries may now adopt the pasted type. In Europe, where there have been no such patent restrictions for a number of years, automobile batteries with both positive and negative Planté plates are practically unknown; the majority of European automobile batteries are strictl plate batteries, while not a few ha tives formed on the Planté princi pasted negatives, and a recent stor tery competition of the French Ac showed these to be the most pract marine work.

The expiration of the patent als this country to the importation of vehicles from Europe equipped wi batteries. There is very little chanc ever, for any appreciable amount ness in this direction. The mechani of electric vehicles certainly has n developed nearly as highly in Eu here, and if automobile batteries ha been brought to a much higher de perfection than here we have fa learn of it. Considering the electr cle as a whole it has undoubtedly the most practical shape in this cou is attested by the fact that Americ tric carriages are sold in almost country in Europe. Electric vehi European construction are as a very clumsy appearance, and mor plicated than those of American m

The expiration of the Brush pate not fail to give a new impetus to tl age battery industry, and to lead to tion of price and improvement in as a result of increased competitior electric automobile industry can onl by these developments.

Racing Restricted in Fran

Recent reports from abroad indic racing will be allowed to only a ve ited extent in France this year. T event that was to take place this the Pioule race, had to be decla owing to the Government refus sanction. Since then two other ra series of races, those at Nice and Pa been suppressed in a similar manne cording to latest advices the Paris-M race has been authorized by the Government, not, however, without ing a number of restrictions in addi those already imposed by the law races on the public highways.

The prospects are that only two will be sanctioned in France this ye Paris-Madrid and Circuit de l'. which latter is organized with the ance of the Government, and for th pose of furthering the use of alco automobile engines.

In prohibiting the Nice races the ernment was undoubtedly influence

certain extent by the wishes of hotel proprietors and other residents of the resort. The races might have been instrumental in drawing to Nice for a few days a small number of sportsmen who would not otherwise have gone there, but it is remembered that last year all through the season there was much complaint among the non-automobiling guests about the reckless manner in which the 30 to 40 horse power racing cars were commonly driven on the roads, the Riviera practically swarming with these monsters. A series of races, such as have been held there for a number of years, would only encourage taking racing cars there, while without these races the same parties might take less speedy and less noisy touring cars.

The French Government has evidently reached the conclusion that a "continuous show" of races can do little to help the automobile industry, and that the danger incurred and the general inconvenience to the road using public make these races undesirable from a general public standpoint.

Front Driving.

A number of years ago, when there was yet no sign of a standard being approached in automobile construction, quite a number of vehicles were brought out in which the front wheels acted at once as steering and driving wheels. This arrangement seemed to be particularly in favor with French inventors. Some of these designs comprised a motor fore carriage, often termed an automobile horse, which for steering turned around a pivot on the vehicle body. In other designs the axle spindles were made hollow, and were pivoted to the front axle on the Ackerman system, and the wheels driven through short concentric shafts, having a flexible driving connection with the driving shaft inside the hollow front axle, this flexible connection compensating for the relative motion of the front axle and steering spindles.

Recently, since certain standards are being followed in automobile design, such sharp deviations from current practice as a front driven vehicle other than electric would be have become less promising as a commercial venture, and in consequence the question of front driving has been practically dropped. It has been taken up again, however, by a Belgian engineer, who has just published a pamphlet on the subject, entitled "Driving and Steering Fore Carriages—Their Past and Future." He goes quite extensively into the subject, describing every construction that has so far been proposed, and pointing out its merits and defects; and also gives a résumé of the present status of the problem of front driving.

Among the advantages claimed for driving by the front wheels is that a certain saving in power is effected. For instance, when the front wheels drop into a depression in the road, it requires considerably less effort to get them out if the propelling effort is applied at their rim than if it is applied to the rear wheels. And when the rear wheels drop into this depression, they are more easily pulled out by the front wheels than the front wheels would be pushed out if the rear wheels were the drivers. By placing a large proportion of the total weight over the front axle, sufficient adhesion may be secured for all conditions of traction, and at the same time almost absolute certainty of steering. It is not an easy matter to secure these two very desirable features in a vehicle in which the rear wheels are drivers and the front wheels steerers, as with a large proportion of weight on the rear wheels the traction may well be sufficient for all conditions, but steering is not always perfectly certain, especially if the differential gear is not entirely free acting.

The most important advantage of front driving is undoubtedly its effect of reducing or overcoming skidding, an advantage which has apparently been fully demonstrated, and is generally admitted. Front driving would also admit of all the parts of the power mechanism being closely grouped together, without seriously interfering with access to any of these parts.

A successful system of front driving must have all the driving mechanism suspended on springs, and must provide a flexible connection between the power mechanism and driving wheels which compensates all relative motion between these parts, be it due a steering motion of the front wheels, up and down play of the suspension springs, or side sway of these springs, and must at the same time transmit power uniformly; that is, without periodic variations in angular speed, for all positions of the wheels and all states of compression of the springs.

The commercial value of front driving cannot well be estimated at present, as it will depend largely upon whether or not the trouble of skidding can be effectively dealt with by other means. In the introduction of a front driven vehicle preconceived notions would undoubtedly offer an obstacle to immediate success.

Experiments with Non-Freezing Liquids—A New Solution Proposed for Cylinder Jackets.

By E. Mallinckrodt, Jr.

Very little accurate experimentation has been reported in the automobile journals upon the subject of a suitable non-freezing liquid for use in the cooling coils of gasoline engines. The matter is not of sufficient importance to engage the attention of chemists, and so we find little if any information in the chemical journals. The most complete article which has come to the notice of the writer is one by E. E. Keller, entitled "Non-Freezing Liquids for Cylinder Jackets." Mr. Keller shows that a solution of calcium chloride of 1.20 sp. gr. can be relied upon to stand a temperature of about 15° below zero, Fahr., which, as he says, is low enough for all practical purposes. In order to determine the corrosive action of this solution Mr. Keller proceeded as follows: Ten to 15 grams of clippings of several metals were accurately weighed before and after immersing them in the hot solution (about 212° Fahr.) for periods of three to nine days. The loss of weight suffered by the metals was very slight, except in the case of zinc and of galvanized iron, neither of which is an important metal for circulating systems. Thus, steel lost 0.07 per cent. of its weight; iron, 0.09 per cent.; copper, 0.07 per cent., and brass practically nothing.

It occurred to the writer that the conditions obtaining in the circulation system of an automobile were not very closely simulated by the above test, because the corroding influence of salt solutions, due to the galvanic action at the junction of two metals, is left out of account. In machines we find, as a rule, contacts of copper and solder, and in some contacts of copper and iron in addition.

Couples were, therefore, made by springing together strips of two metals, and the loss after submerging them in the solution for definite periods of time was accurately determined by weighing. In this way we tried the corrosive action of an alkaline commercial calcium chloride containing about 0.06 per cent. of free alkali, figured as calcium oxide, of a neutral solution of commercial calcium chloride and of an alkaline commercial calcium chloride (containing, as before, 0.06 per cent. of free alkali), to which an additional 0.06 per cent. of quicklime (calcium oxide) had been added. The couples were made from strips of carefully cleaned sheet iron, sheet brass and sheet copper about 3½ inches long, one-quarter inch wide and one-sixteenth inch thick, and somewhat resembled elliptical springs. In all cases the couples were completely submerged for ten days, seven days at ordinary room temperature and three days at the boiling point of the solution. The experimental work was done by Dr. Charles E. Caspari in the Research Laboratory of the Mallinckrodt Chemical

Works at St. Louis. The results are as follows:

Experiment 1—Couples immersed ten days in a solution of commercial calcium chloride of specific gravity 1.20. The commercial salt contained 0.06 per cent.; free alkali figured as calcium oxide.

Copper-Iron Couple—

Weight of iron before, 5.150 g.; weight of iron after, 5.133 g.; loss, .33 per cent.

Weight of copper before, 10.425 g.; weight of copper after, 10.429 g.; loss, .04 per cent.

Brass-Iron Couple—

Weight of iron before, 4.73 g.; weight of iron after, 4.708 g.; loss, .46 per cent.

Weight of brass before, 14.298 g.; weight of brass after, 14.298 g.; loss, .00 per cent.

Experiment 2—Couples immersed ten days in a solution of commercial calcium chloride of specific gravity 1.20. The free alkali was exactly neutralized by the addition of a slight amount of acid, thus forming a neutral solution.

Copper-Iron Couple—

Weight of iron before, 5.098; loss after corrosion, 0.68 per cent.

Weight of copper before, 10.427; loss after corrosion, 0.02 per cent.

Brass-Iron Couple—

Weight of iron before, 4.671; loss after corrosion, 0.80 per cent.

Weight of brass before, 14.319; gain after corrosion, 0.15 per cent.

Experiment 3—Couples immersed ten days in a solution of commercial calcium chloride of specific gravity 1.20. To the calcium chloride was added as much calcium oxide as it contained originally. The total alkali was thus doubled and amounted to about 0.12 per cent., figured as calcium oxide.

Copper-Iron Couple—

Weight of iron before, 4.545; weight of iron after, 4.531; loss, 0.31 per cent;

Weight of copper before, 9.690; weight of copper after, 9.699; gain, 0.09 per cent.

Brass-Iron Couple—

Weight of iron before, 4.154; weight of iron after, 4.142; loss, 0.29 per cent.

Weight of brass before, 12.021; weight of brass after, 12.030; gain, 0.08 per cent.

While it is not claimed that the above figures give any clue to the actual loss by corrosion that might be expected in circulation systems, it seems reasonable to believe that relative losses using the different solutions find here a correct index. The general trend of the results is clear, and confirms the recommendation made by several of your subscribers, that a small amount of lime should be added to solutions of chloride of calcium to insure slight alkalinity. From experiments 1 and 3 it appears that doubling the amount of free alkali causes only a slight diminution of the corrosion loss. Thus in Experiment 1 the average of the iron strips shows a loss of 0.40 per cent. compared with a loss of 0.30 for the average of the iron strips in Experiment 3. The average of the brass and copper in the first case shows a loss of about 0.02, compared with a gain of 0.08 per cent. in the second case. In none of the three experiments are the gains in the weights of the brass and copper strips sufficiently above the possible experimental errors to warrant drawing any conclusion other than that an alkaline or neutral solution of chloride of calcium exerts a corrosive action on completely submerged brass and copper that is small and for most purposes negligible. In the case of iron on the other hand, as may be seen from Experiment 2, the corrosive action of a neutral solution appears to be considerable. Thus, the iron strips lost about 0.75 per cent. of their weight. The brass seems to be considerably affected, having gained about 0.15 per cent. Touching the point of gain in weight in the case of brass and copper, it should be mentioned that the difficulty of removing the corrosion without removing the clean metal is considerable, especially when the total change that we endeavor to measure is scarcely 0.1 per cent. of the total weight involved. Consequently, since corrosion without removal increases the weight of the metal, we must regard increase of weight as well as decrease in weight as evidence of corrosion.

Since, even with alkaline solutions of chloride of calcium, the loss of iron seemed rather large to the writer, experiments were tried with other salts. Sodium carbonate, which is added as a rust preventive to the boiling water in which surgeons sterilize their instruments, was found to be too little soluble in water to depress the freezing point materially. Potassium carbonate gave better results, but the freezing point of a solution of about 50 g. in 100 g. of water was above 2° Fahr. If, however, glycerine is added, the freezing point is greatly lowered. A solution of seventy-five parts (by weight) of ordinary carbonate of potassium (salts of tartar) in 100 parts (by weight) of water, to which fifty parts (by weight) of glycerine has been added, was found by actual experiment to remain perfectly liquid at a temperature of 22° below zero, Fahr., beyond which the thermometer was not graduated. The freezing mixture used was composed of snow and crystallized calcium chloride ($CaCl_2 + 6\ H_2O$). The ordinary commercial calcium chloride will not answer, as it does not contain the full amount of water of crystallization.

Less glycerine would be required for a higher freezing point, but no experiments were made to determine the exact proportion of glycerine for more moderate temperatures.

This solution, having shown satisfactory non-freezing properties, was now allowed to act on the metals in precisely the same way as detailed in Experiments 1, with the following results:

Experiment of couples immersed days in glycerine potassium ca solution:

Iron-Copper Couple—

Weight of iron before, 3.4305; of iron after, 3.4297; loss, cent.

Weight of copper before, weight of copper after, 9.19 0.01 per cent.

Iorn-Brass Couple—

Weight of iron before, 3.7813; of iron after, 3.7777; loss, o cent.

Weight of brass before, 11.3633; of brass after, 11.3627; loss, o cent.

It is plain from the above that th sive effect of the solution is practic the average loss being in the case about one-fifth of that occurring most favorable experiment (3) with chloride. In the case of brass and neglecting the losses of 0.01 per c 0.005 per cent., as being due to mental variation, we see that neit nor loss took place, another mar provement over the chloride From a chemical point of view, this of potassium carbonate and glycerin to be permanent even under the heating and cooling taking place i mobile use, as the ingredients do n on metals or on each other. Based results of the above experiments, call the attention of those using machines during the winter to this believing that it is a safe and cle stitute for calcium chloride, which appears to possess considerable c action on iron. Very probably the alkaline carbonates and glycerine is tirely new to some of the readers HORSELESS AGE, and if any have us a mixture it would be interesting of the results. The writer intends the solution hereafter on his own in place of calcium chloride.

The carbonate of potash was dried article, but contained about 5 of water. It should cost 10 to 25 c pound. Glycerine may be bought 15 cents to 25 cents per pound.

Compression in Gasoline En

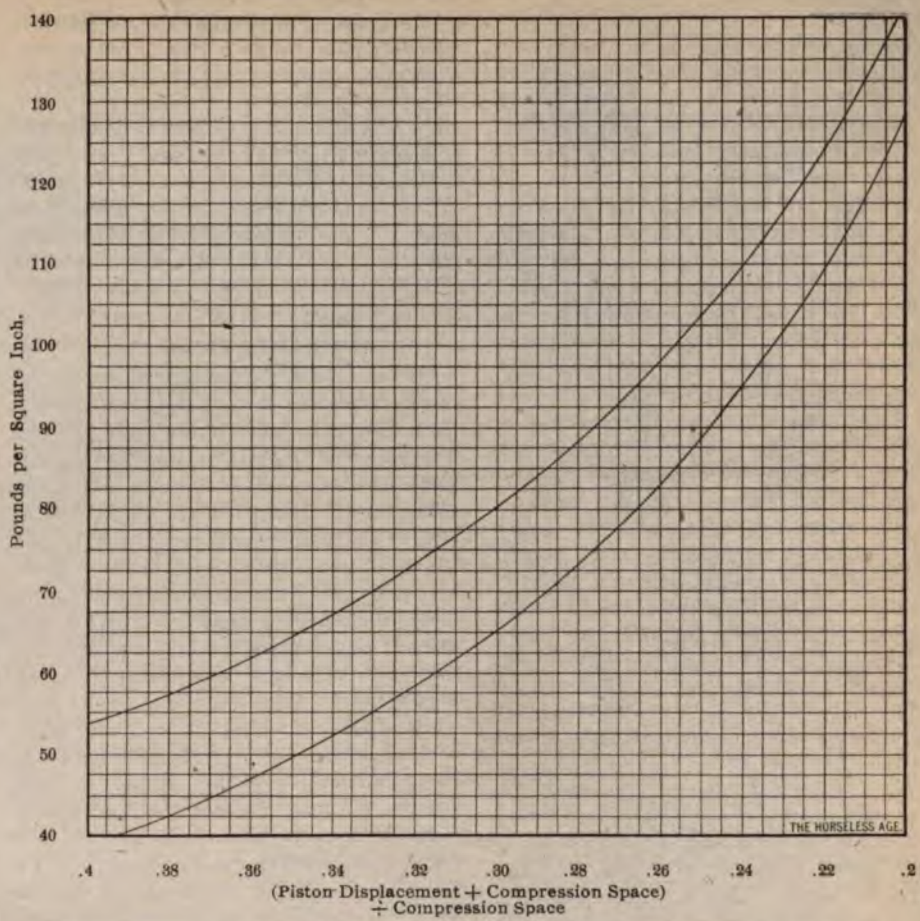
Many novices with gasoline engi agine that the compression pressure line engines rises in the same propo the volume decreases, and we wer what surprised recently to see this finding the compression recommer one of our English contemporarie Lussac's law, that with a perfect g sure and volume vary in inverse tions, is often thought to apply pression in gasoline engines, but it d as this law only holds for therr compression or compression at temperature.

When air or gases are compress

are two distinct causes for the pressure to rise. The reduction of the volume of the gas naturally results in a rise of pressure, but it also causes a heating of the gas, and the heat thus generated produces a further increase in pressure. That is to say, for a given reduction in volume the rise in pressure will be greater if the heat generated by the compression remains within the gases than if some cooling means are employed to keep the compressed gases at a constant temperature. That heating causes the pressure of a gas to rise, if the volume remains constant, is a phenomenon familiar to everyone. The heat, of course, has the same effect if the volume of the gas is changed at the same time that the heat is imparted.

If the compression pressure of the gas varied in inverse proportion to the volume when a certain quantity of gas at atmospheric pressure was reduced to one-half its original volume, the absolute pressure would be 29.4 pounds per square inch; if reduced to one-third its original volume, the pressure would be 44.1 pounds per square inch, and so on. Instead we find that if the volume is reduced to one-half, the pressure rises to practically 40 pounds per square inch; if reduced to one-third, to 69 pounds, and if reduced to one-quarter, to 104 pounds absolute pressure.

The accompanying diagram permits of easily finding the compression pressure for any proportion of compression space to total volume of piston displacement and compression space employed in practice. The abscissas represent this ratio of compression space to piston displacement plus compression space, and the ordinates represent pounds per square inch. The upper curve gives the absolute compression pressure and the lower curve the gauge pressure. For any given compression space the gauge pressure is less than the absolute pressure by the pressure of the atmosphere, 14.7 pounds.



UPPER CURVE, ABSOLUTE COMPRESSION. LOWER CURVE, COMPRESSION BY GAUGE.

These curves give the compression pressure that would be obtained if the cylinder at the end of the suction stroke was filled with gases at atmospheric pressure and if there was absolutely no leakage from the cylinder and no interchange of heat between the cylinder walls and the charge during the compression stroke. None of these conditions is completely satisfied, and in practice the compression is probably always slightly below that given by the curves.

Steam Cars at the Crystal Palace Show.

By J. S. V. Bickford.

(Concluded.)

THE GARDNER SERPOLLET.

There are many conflicting opinions about this car in use. The attendant at the stand at the Palace stated that he would guarantee to ascend a hill of 1 in 4 without hand pumping, while another gentleman to whom I mentioned the matter of hand pumping spoke of "rowing" yourself up hill. What the exact truth is is difficult to say, but it would appear that if the maker's statements are accurate considerable skill is required to get anything like the best results from the car. Most people know that the latest type of this car is fitted with a sort of hydraulic accumulator consisting of a spring controlled piston working in a cylinder. The water from the pump has access to the lower side of this piston and compresses the spring, thus filling the cylinder. When it is required to start from rest, the water in this accumulator is turned into the boiler. By this means all hand pumping is said to be avoided and it is also said that the store of water in the accumulator will last for a month if not used. That is to say, it will not all leak out in that time.

THE CHELMSFORD CAR.

This is one of Mr. Clarkson's designs and presents a first rate appearance, while the engine is thoroughly sound and anything but a toy. It is fitted with Joy's valve gear and has the differential shaft inside the same gear cast. On the show stand the company had an interesting exhibit in the form of one of these engines worked by a water motor, and with glass plates replacing all the cover plates of the engine case. This showed well the forced oil lubrication, which is a special feature of this system, the whole of the working parts being bathed in oil and dripping with it all the time. This car was fully described in a recent issue of The Horseless Age.

STEAM CONDENSERS.

A considerable variety of condensers was shown at the Palace, and a fortnight earlier at the Earl's Court exhibition. Many of these are made by the Albany Manufacturing Company, who make a specialty of condensers and radiators, which are, of course, about the same thing, except that a radiator cooling water will, for some rather occult reason, get rid of nearly three times the heat in a given time that it will when used to condense steam under the same conditions. The most usual form of the Albany condenser is a series of very much flattened tubes or double plates A (Fig. 6), soft soldered into headers B B. Between these flat plates are inserted and tinned in place corrugated plates C, making a junction with both the water passages, which plates serve as first rate heat dispersers. Another form of condenser made by this company, but more used for car radiators than for steam condensers, is formed by taking a large number of copper tubes 4 inches long and three-eighths inch diameter and swaging up both ends to a hexagon form. A large number of these tubes are then placed touching one another, the end view of the whole being exactly like

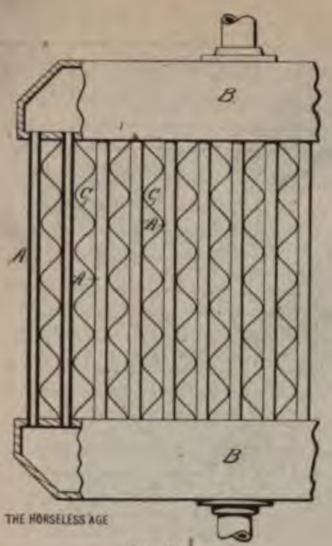


FIG. 6.

a honeycomb. These ends are held in position and sweated together with solder. A moment's thought will show that this construction allows a free passage between the tubes for the cooling water. Of course this bundle of tubes is surrounded by a shell, which converts it into a tank on the Mercedes style.

The Clarkson condensers, of which several were shown at the Chelmsford stand, are made by wrapping a long helix of wire round a copper tube and then tinning the whole. That is to say, a wire of perhaps 20 gauge is first wrapped round a mandrel to form a long helix, and then this helix is taken and its axis is bent to form another helix around the tube. In this way the tube is completely covered with wire loops. I have no information as to the condensing power of this arrangement.

The Motor Construction Company, of Nottingham, show a new type of condenser. It may be remembered that some time since the writer described in THE HORSELESS AGE that he had tried a sort of jet air condenser in which a jet of steam to be condensed carried air into a stack of perforated plates, the result being a failure. In this company's condenser the two methods are combined. The exhaust steam is delivered into a header which may be used as a feed heater, and from this header a very large number of one-eighth inch bore copper tubes are taken, each one of which looks axially down a three-quarter inch tube the axis of which is parallel to the car motion and its mouth pointed forward, so that the draught of the car assists the induction of air into the tubes. In this way steam and air mixed enter the condenser, and it is claimed that both sides of the tube are available for condensing. I should be inclined to doubt this statement, as in the above experiment the condensation was exactly what it would have been if the outer vessel covering the perforated plates had been simply used as a surface condenser. If the two surfaces are available (on account of the entrained air) for cooling the results ought to have been twice as good.

THE ALBANY TORPEDO CONDENSER.

This consists of a number of 2½ inch copper tubes surrounded by a case to receive the exhaust steam. These large tubes are crossed in every direction by what may be described as Galloway tubes, through which the steam circulates, the air surrounding and rushing between them as the car travels.

FEED WATER REGULATORS.

Of late years the revival of the steam car has turned a large amount of ingenuity in this direction. There are now quite a number of regulators on the market, some of which will work quite well. Mr. Clarkson is said to be about to fit one to the Chelmsford car, and it is said to be of the thermostatic order. There are, as far as I know, four different principles on which a regulator may be designed: (1) the float; (2) the fact that the water in a pipe attached to a boiler may be cold while the boiler is in use, while a pipe containing boiler steam must, so long as it contains steam, always be at the temperature of the steam and hot; (3) the fact that the steam and water are different as to physical characteristics, one being compressible and the other not. To this may be added a fourth class, in which a pump draws its steam from water level and is arranged to work either as a steam engine or hydraulic engine. That is to say, it will continue to work after its steam pipe mouth is below water level.

At the Palace Show was exhibited one feed regulator on the float principle, and at the Earl's Court Show was a modification of the last arrangement.

The Motor Construction Company's regulator is made something as follows, the sketch and descriptions being purely diagrammatic, as the apparatus I examined could not be properly opened up:

The vessel A (Fig. 7) is steam tight and communicates with the bottom of the boiler by the pipe B and with the desired water level of the boiler by the pipe C. Inside this chamber is the small tank D, of which the top is open and the interior

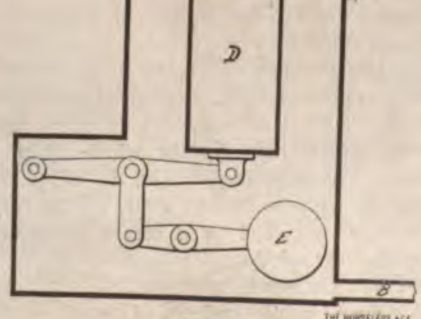


FIG. 7.

full of water. The chamber D is st ed by a series of links by the we when the chamber A is full of wat when the chamber A is empty the of D overcomes that of E, and th falls, opening a steam relay which the feed overflow and thus feed boiler. The action is fairly ol When the water in the boiler cove mouth of the tube C the chamber once fills with water, which comes take the place of the steam whic previously there and which is, of c condensing all the time. This water the chamber, with the assistance counterweight, closes the relay valv stops the feed.

The Fleuss regulator at the Earl's Show is designed on another pri altogether. A small vessel takes a c of water from a chamber into whic feed pump delivers and passes it another chamber in communication the boiler at water level. If that ber is already full of water it brin charge of water back again, and if empty it leaves it there. The actua struction of the Fleuss regulator w clear from an inspection of Fig. 8. plunger A is attached to some part engine and is kept moving backwar forward like a pump plunger all the At one end is an annular recess, B. plunger A works in a case C havin

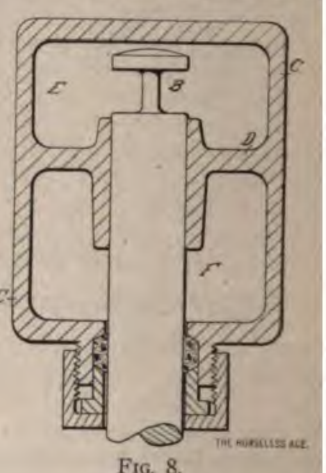


FIG. 8.

chambers separated by the partitio through which the plunger A works. pump delivers into the chamber E an water, if not required to feed the b overflows through the relief valve, shown. The chamber F is connected the boiler at the bottom thereof, either at the water level or at the to the steam space, it does not matter w If, then, the water level falls so as to the chamber F empty, the plunger n backward with the annulus B full of w and on entering the chamber F this is left behind and the annulus goes for more. If, on the other hand, chamber F happens to be full of w the annulus goes back into the cha E still full of water, and no water is a to the boiler. The apparatus was sh

attached to a Locomobile and was said to work well in practice.

There were no feed regulators shown operating on the second principle, though in the writer's opinion it is by far the most certain; it is, however, rather more difficult to make a satisfactory feed regulator on this principle. That is to say, more precautions are necessary. Several regulators of this class have been made in the United States lately, but most of them depend on the expansion of a bar of metal. As this expansion between the limits of temperature available is not considerable, very accurate adjustment is necessary. If, however, a chamber full of water be substituted for the metal rod the conditions are quite changed. Such an apparatus was patented recently by the writer in the United States and by Mr. Eden in England almost simultaneously. The apparatus is constructed as follows, and was tested for a long time on a small

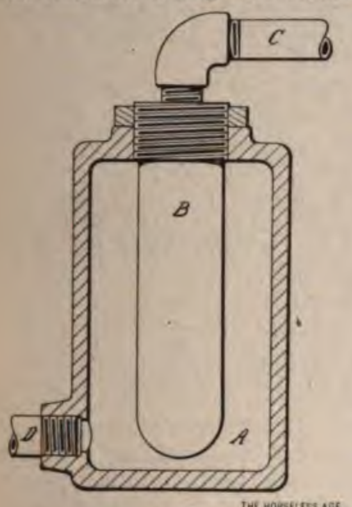


Fig. 9.

Belleville boiler with very satisfactory results:

The chamber A (Fig. 9) communicates with the boiler at the desired water level only, and is closed at the top. In through this top passes the closed chamber B, communicating with the diaphragm valve of the feed regulator (not shown) by the pipe C. The feed water in entering the boiler passes through a jacket surrounding the chamber A, which jacket is omitted for the sake of clearness. The action depends on the following principle: If a hermetically sealed vessel full of water be plunged into a boiler under any given steam pressure containing saturated steam the closed vessel will immediately acquire the same pressure as the surrounding steam. This is obvious if it be considered that steam at any given pressure has always the same temperature, and that water at any temperature above boiling point must always have the pressure of saturated steam of that temperature, as otherwise it would evaporate. The action of the apparatus is as follows: Suppose the water to be low and steam to be raised. As soon as steam is made it enters the chamber A and warms the water in the vessel B to its own temperature and gives it in consequence its own pressure. This pressure acts through a small pipe C on the diaphragm valve, which controls the feed and thereby closes the feed overflow to the tank and compels the feed to pass through the jacket surrounding the chamber A and enter the boiler. This cold feed passing round the chamber A condenses the steam in it, which passes back to the boiler through the pipe D and is replaced by more steam immediately on the water level in the boiler covering the tube D; however, the condensed steam is replaced by water which is then in a "dead end," and the cool feed passing through A the surrounding jacket cools this water down, which in turn cools the water in the vessel B, and this relieves the pressure on the diaphragm and opens the feed overflow. In practice it is found that the valve opens about once a minute. A pressure gauge connected with the internal system and placed on the car dashboard shows that all is working properly, for the pressure should rise to boiler pressure and fall again to a comparatively low point continually. In principle Eden's valve is the same as this, though it differs considerably in structure.

THE STRAKER STEAM TRUCK

(FIG. 10).

The steering of this car is on the fifth wheel principle, the front axle not being articulated on the Ackerman system. On the fifth wheel itself are teeth of a worm gear and into these engages the worm, which is geared by reducing bevel gearing to the steering handle.

The weight, as in the Thornycroft, is carried by a transverse spring in the middle, but the ends of this spring are carried by drag links. The car is propelled by compound engines, the reversing gear being by an ingenious arrangement for shifting the eccentrics on the shaft. The reversing lever moves the sleeves on the crank shaft. To this sleeve is attached a lug. On the eccentric is fixed another lug, holding a bell crank lever, one end of which is attached to a rigid block attached to the crank shaft and the other end to the lug on the eccentric. It will now be seen that by moving the sleeve along the shaft the eccentric will be caused to move transversely, and by arranging the slot properly in which the block moves it is easy to reverse the engine. The boiler is a water tube, and the change speed gear (which gives two speeds) is only operated from the road—with the wagon at rest. The body is conveniently arranged well clear of the under frame, so that all the gearing can be readily reached for adjustment.

THORNYCROFTS.

This company had a considerable exhibit of trucks besides gasoline cars, but there were no exhibits of working parts, and the general description of the vehicle is already well known; but the following details of the running gear will be of interest. The forecarriage under the boiler is carried on one cross spring A (Fig. 11), the ends of which rest on the axle B. This axle is set between the horn plates C C, allowing it free vertical play but prevent-

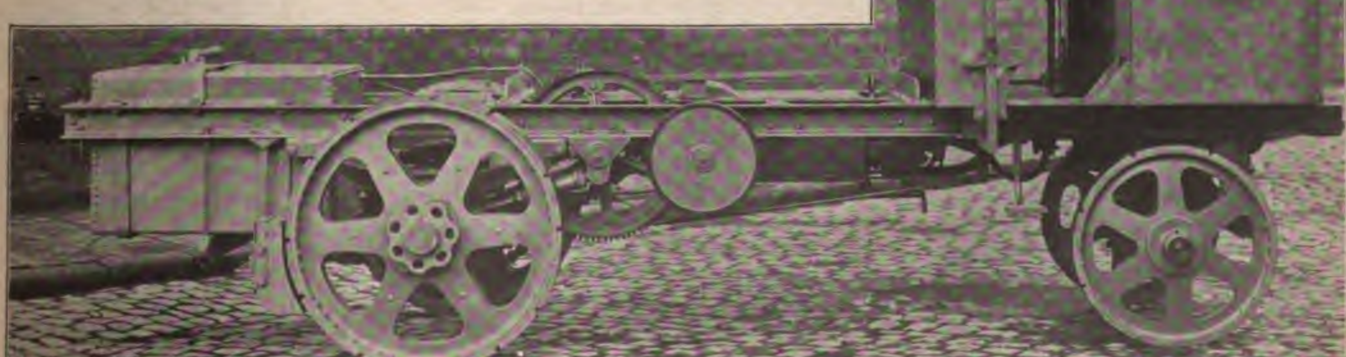


Fig. 10.

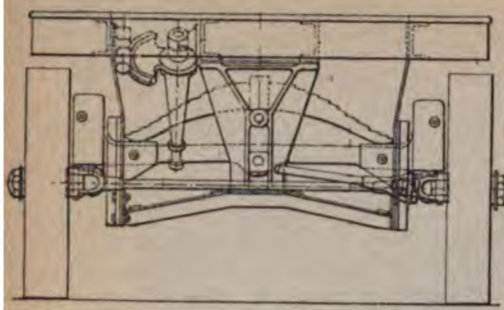


FIG. 11.

ing all fore and aft motion. The centre of the axle carries a couple of sliding blocks D which work between transverse horn plates (not shown), preventing the axle from shifting sideways, while the spring attachment is through a pin P, which allows the front axle to go "into winding" with the back axle in taking uneven ground.

Fig. 12 shows the Thornycroft steering arm end. The steering is effected through a worm and sector, but the end of the lever attached to the sector passes through the hole A in the block B. In this hole it is free to rotate, while the block B is free to turn about the pin C. There is nothing very original in this piece of mechanism, but it is strong and very simple and therefore worthy of notice.

THE HYDROLEUM COMPANY.

This company have lately introduced a burner for burning heavy crude oils (not kerosene), and shows a small American steam car fitted with their burner. There is little new about this burner in principle, though the makers claim considerable merit for the shape of the nozzles. The principle of action is the same as nearly every spray burner on the market. There are two concentric tubes (Fig 13), through the central one of which, A, the oil is fed and through the outer one steam from the boiler, while up the middle of all passes a regulating pin for the oil. This burner, for small steam car work, delivers its blast against a brick set at an angle of 45 degrees in a passage branching from the fire box (Fig. 14). It is obvious that steam must be raised before

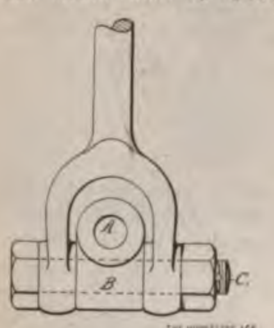
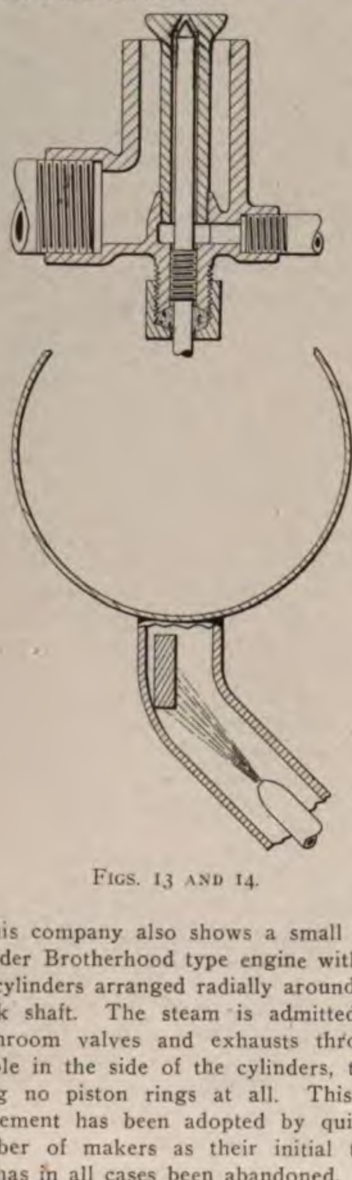


FIG. 12.

the apparatus can be brought into use. The makers say that this is done by about one-half pint of alcohol, and this will be found not to be impossible if the amount of water in the boilers of these cars and their comparatively high efficiency at low temperatures be considered. The oil is supplied to the burner through a float feed box like a carburetor float, which keeps the feed constant. The consumption of oil is said to be higher than in the case of the gasoline burner, but the cost is of course very low, as these heavy crude oils can be bought for very little. A petroleum pilot light with a wick is kept burning in front of the burner to relight it if it is blown out.



FIGS. 13 AND 14.

This company also shows a small four cylinder Brotherhood type engine with all the cylinders arranged radially around the crank shaft. The steam is admitted by mushroom valves and exhausts through a hole in the side of the cylinders, there being no piston rings at all. This arrangement has been adopted by quite a number of makers as their initial type, but has in all cases been abandoned. The advantages are very slight over the "four (or three) cylinder in line" arrangement, and the disadvantage is that the advantages of a single acting engine are lost to some extent, for though the connecting rods are all in compression, the crank is not always thrust in one direction, so that while a "three cylinder in line" engine can be run at full speed when it has daylight showing below every brass, the radial type engine knocks if the crank shaft works loose. The exhaust through the cylinder side has also been abandoned by everyone who has tried it, as far as I can find out. Willans & Robinson used to use it; Sim
Bibby used it, and several others,
of them have put in exhaust valve
The engine works beautifully wh
ning light, and on account of th
compression runs without a sou
when you come to use the engine
road the high compression rui
economy.

The valve ends of this engine
genious. To avoid the side thr
separable from the action of the ca
valve stems do not come to the
of the valve stem case but stop
about one-quarter inch from the e
low the valve foot there is a three
inch bicycle ball, and it is this t
cam strikes to raise the valve.
shows this arrangement.

The company also show a wat
boiler for automobiles which is
work well. This I can believe,
there are one or two points in i
struction which I do not like. It is
as follows: A square ring A (Fig.
planed on its edges and two plate
are placed over it and bolted firm
gether all around, to make a wat
joint. Into one of these plates a
the ends of tube loops as shown
burner delivers its jet of flame
these tubes, which raise steam
and well. My own somewhat exh
experiments in this direction lead
expect that this boiler would steam
but I should not much care to h
keep the joints of the header tight
top of the boiler is a steam drum C

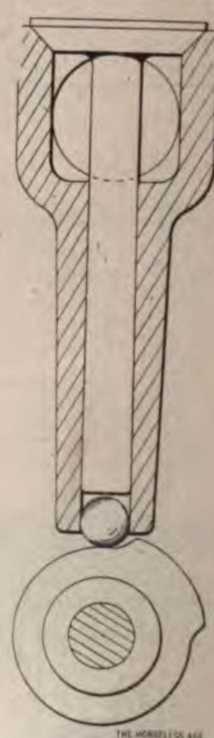


FIG. 15.

which the downcomer D is taken.
steam is taken from the drum thro
perforated pipe.

In addition to the accessories a

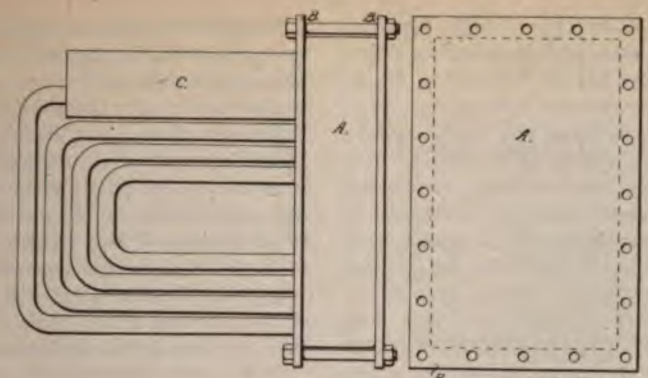


Fig. 16.

mentioned, the following points are worthy of special mention:

Bowden wires.—These consist of a closely wound spiral or helix of wire forming a flexible tube inside which works a small steel wire rope. The outer case may be twisted into any shape or round any corners, and on pulling the inner wire rope it will render through the case and transmit the power from one end to the other. The company makes the fittings in two types, single and double acting. In the former the return motion is obtained with a spring, but in the latter two distinct Bowdens are used in separate cases, and are attached to opposite sides of the actuating handle. I do not think anyone would advocate the use of these wires for either main brakes, steering gear, main steam lever or any of the primary motions of the car, but for such things as exhaust valve lifting, opening pet cocks, opening lubricators, drain cocks, gauge glass cocks, burner cocks, etc., they are very useful. The company does not standardize much, the difficulties being that no two manufacturers agree on the fittings they require. At the Earl's Court Show there was a M. M. C. car completely fitted out with these wires for operating gas valves, ignition, etc., and the effect was very good and simple.

TRIER BROTHERS, WESTMINSTER.

This firm showed a considerable number of interesting details. One of these was an arrangement for motor bikes to prevent slipping of belts. It consists of what the firm calls their Sku grip pulley. The principle consists in having the rim of the pulley in one with one flange, while the other flange is separate and is carried by the boss. In this way the two rims of the pulley always lie at an angle to one another, the part of the rims at any moment furthest from the other pulley being nearest together. Thus the belt is always jammed between the rims, and no slipping is possible. Fig. 17 will make the construction clear. The rim A and flange B are in one, and are mounted on a universal connection C. To the other rim is fixed the hub, which fits on the shaft of the engine, and this flange also carries a dummy rim D inside the rim. The inside of the rim A is about one-eighth of an inch larger than the outside of the rim D. By this means and by virtue of the universal joint the flanges can take up an angular position.

This firm also showed a handy little lubricator of the Stauffer type (Fig. 18). The screw A and stem C terminate inside the cap B in the usual screw to which the cap (full of grease) B screws. The act of screwing the cap B on to the stem forces the grease down through the hollow shank C to the bearing. On the shank C are two flats D, and over the shank fits the collar E, having two internal flats fitting the flats on the stem and preventing it from rotating. It will be noted that the upper edge of the collar E is cam shaped, fitting the cam shaped under edge of the screw cap B. By this means and by virtue of the spring F, which keeps the collar in contact with the under edge of the cap, the lubricator is prevented from coming undone.

An interesting radiator gill is shown by Messrs. Phillipp & Co. It must have occurred to some engineers that it would be a very convenient method of making a radiator gill and fastening it to the pipe if it were only possible to so bend a strip

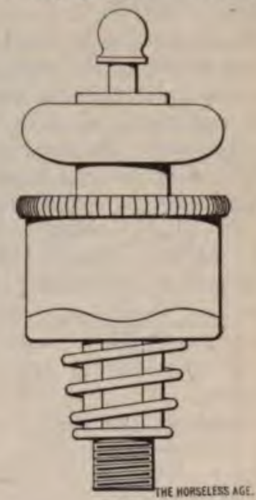


Fig. 18.

of metal so as to form a very deep screw thread on the pipe similar to a conveyor screw. This is not ordinarily possible, on account of the impossibility of sufficiently compressing the inside edge of the strip and stretching the outside. In this radiator the difficulty is overcome by crimping the inside edge of the strip.

American Vehicles and Parts at the Crystal Palace Show.

The following is a list of exhibitors at the Crystal Palace Show who exhibited vehicles and parts of American manufacture, and the manufactures they handle:

Vacuum Oil Company, Rochester Pony Lubricator; Duryea Company, of Coventry; Duryea carriages; Joseph Cockshoot & Co., of Manchester, Northern gasoline car and the Locke Regulator Company's specialties; John L. Sardy, Meteor steam car; Anglo-American Motor Car Company, Oldsmobile, Winton, Baker, Vehicle Equipment electric trucks; Locomobile Company of Great Britain, locomobiles; South British Trading Company, Twentieth Century lamps, Fisk tires, Forg burners and general line of American tools (by Bemis & Call, of Springfield, Mass.); Carlton R. Radcliffe, U. S. Long Distance; Davis, Allen & Co., Solar lamps; Victoria Carriage Company, Toledo steamers; W. H. Wilcox & Co., Limited, of London, S. E., American tools and steam specialties; Kitto Auto Company, Conrad gasoline vehicles; Petrol Motor Power Company, Peerless touring car and Rambler runabout; Weston Motor Company, Grout steamers.

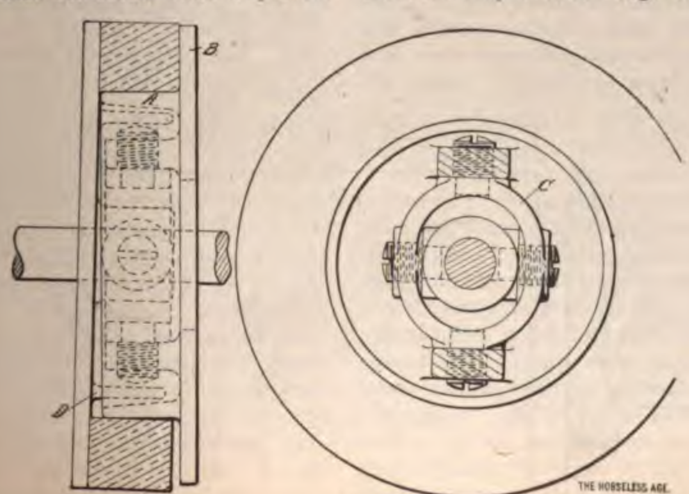


Fig. 17.

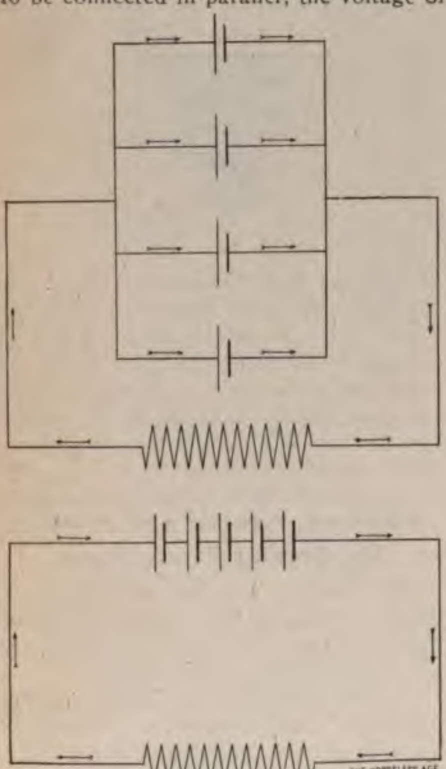
BEGINNERS PAGE.

The Storage Battery.

(Concluded.)

GROUPING OF CELLS.

Battery cells may be connected up in three different ways, as shown by the accompanying diagrams. In these diagrams the long thin lines represent the positive electrodes and the short thick lines the negative electrodes. The cell may first be connected, as shown in Fig. 1, with all the positive electrodes or terminals connected together and all the negative electrodes connected together. The cells are then said to be connected in parallel; the voltage or



FIGS. 1 AND 2.

electromotive force of the whole battery is only that of a single cell, but the current which may safely be taken from the battery is equal to the safe current for a single cell multiplied by the number of cells. The current flow for discharge is indicated by the arrows, and it will be noted that each cell contributes its share to the total current.

Another method of connecting the cells, known as series connection, is shown in Fig. 2. The positive terminal of one cell is always connected to the negative terminal of the next, except as regards the two end cells in the series. With this form of connection the electromotive force of all the cells is added, but the same current flows through each of the cells, and the maximum safe current is therefore the same as with a single cell.

The third connection, illustrated in Fig.

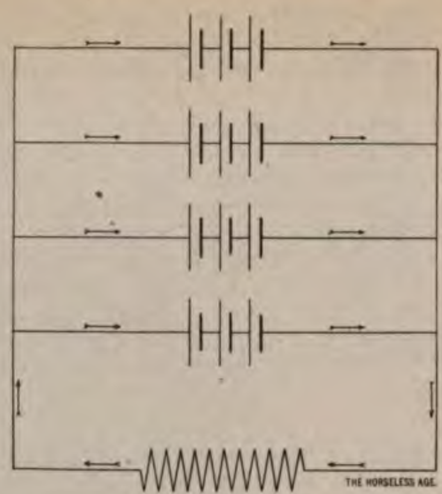


FIG. 3.

3, is known as mixed connection, the cells being grouped partly in series and partly in parallel. The electromotive force of such a battery depends upon the number of cells in each series and the safe current strength upon the number of parallel rows of cells.

The cells of an automobile storage battery are only connected in series or partly in series and partly in parallel—never all in parallel.

ELECTRIC POWER MEASUREMENT.

We have seen that mechanical power is composed of two factors, speed and force. Electric power also is composed of two factors, electromotive force and current. The power developed in an electric circuit is obtained by multiplying together the electromotive force in volts by the current in amperes. The unit of electrical power is the watt, which corresponds to a current of 1 ampere at an electromotive force of 1 volt. The watts developed in a circuit are found by multiplying the volts by the amperes. One horse power is equal to 746 watts. Another unit sometimes used for rating electric machinery is the kilowatt, which is equal to 1,000 watts, or about 1⅓ horse power.

THE CAPACITY OF CELLS.

To give the reader an idea of the capacity of storage cells for storing energy, some figures may advantageously be given. Planté cells have a lower capacity than Faure or pasted plate cells, but they have the compensating advantage of longer life. A Planté cell weighing complete 20 p will give about 60 ampere hours wh charged at a three hour rate. It v understood that the capacity varies different makes of this kind of cell, b figure represents an average. If 6 pere hours are discharged in three the current flow is, of course, 20 am or at the rate of one ampere per po cell. As the average voltage of dis is about 2 volts, the energy discharged cell is 120 watt hours. The capacity lighter Faure cells is perhaps double

It has been found in experiment electric vehicles that to propel a weighing a ton over a good level roa face at the rate of 12 miles an hour r approximately 2 electrical horse pow propel such a vehicle at this speed fo hours, making a total mileage of 36 requires therefore 6 electrical horse hours. One horse power hour is eq 746 watt hours, and expressed in hours the energy required for a run miles is therefore 6 × 746 = 4,47 hours. We saw that a cell weigh pounds delivered 120 watt hours—i watt hours per pound. Hence a battery capable of propelling a ton 36 miles would have to weigh 4,476 ÷ 746 pounds. With the lighter ty Faure batteries only one-half this weight would be required.

The capacity and the life of a c to a certain extent oppositely v quantities. That is to say, with a type of cell, as the capacity is increas life of the cell decreases. This w easily understood when it is consider the only general method of increasi capacity for unit weight is to ma support of lead as fine as possible a crease the amount of active material also explains why the majority of vehicles are made to run up to 40 m one charge only, although trips of o miles are claimed to have been plished on a single charge.

CARE OF BATTERIES.

Some notes may here properly be on the care of storage batteries. T tery should never be allowed to dis below a certain voltage per cell, th given by most manufacturers bei volts. If the discharge is continued this point, lead sulphate is formed

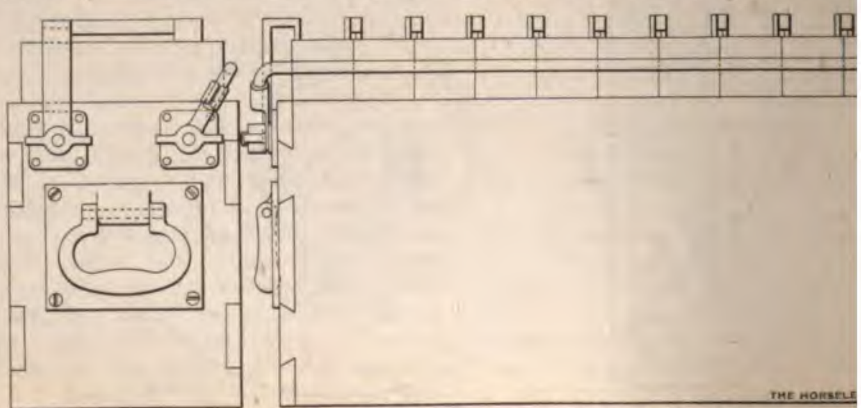


FIG. 4.—END AND SIDE ELEVATION OF A TRAY OF BATTERIES.

plates, which greatly reduces the capacity of the cells. The batteries should always be recharged immediately after a trip, even if only partially discharged. The result of letting the batteries stand in an uncharged condition is the same as over-discharging them. In charging batteries the positive terminal of the line is connected to the positive battery terminal and the negative line terminal to the negative battery terminal. It is not advisable to charge the batteries too rapidly, as this reduces the economy of charging and tends to deteriorate the batteries. When the charging current is very high the electrolyte will assume a sort of milky appearance, owing to a myriad of small gas bubbles rising through it. This gas is formed from the water by the passage of the current and indicates that some of the current going into the battery is wasted.

When the battery has become fully charged this is also indicated by "boiling" of the electrolyte or by the sizzling sound accompanying it. There is less harm in overcharging a battery than in overdischarging it, the most serious objection to overcharging being the total loss of the electrical energy.

The electrolyte of the cells must periodically be replenished, to make up for what is lost by evaporation and electrolytic decomposition. Some manufacturers supply the acid solution already prepared. When it cannot be obtained in this manner chemically pure sulphuric acid must be obtained and mixed with rainwater in the proportions specified by the manufacturer. In making such an acid solution the acid must always be poured (very carefully) into the water, never the water into the acid, as it will splash up and is likely to splash into the face of a person. When the sulphuric acid is dissolved in the water the solution heats considerably. It should not be put into the cells before it has cooled off. The solution is usually put into the cells by means of a siphon with a rubber bulb.

THE HYDROMETER.

A solution of a certain proportion has, of course, a certain specific gravity, and to test a battery solution an instrument known as a Baume hydrometer is generally used. It consists of a hollow sealed glass tube weighted at one end and with a scale inscribed on it at the other end. This tube floats in the solution in an upright position and sinks into it more or less according to the density of the solution. The scale is so arranged that when the instrument is placed in pure water the beginning of the scale, marked 1, is even with the surface of the water. Acid solution being heavier than water, the instrument sinks less deeply into it.

For large automobiles batteries of forty or forty-four cells are generally used, this number being preferred on account of the convenience in charging from direct current lighting circuits, which generally carry 110 volts, and this is just about the proper voltage for charging a battery of this number of cells. With the runabout type of vehicles it is found that considerably more capacity can be obtained by using a smaller number of cells of larger size, and the lightest vehicles are equipped with only ten cells.

In charging the battery all of the cells are always connected up in series, which insures that all of them receive exactly the same charge. The counter electromotive force of the cells rises as the charging continues, and in case the battery is charged from constant potential circuits the current will gradually decrease as the charge continues, unless there is a resistance in circuit, which is gradually cut out. If the battery is charged from a shunt dynamo, driven by an explosive engine without governor, the speed of the engine will automatically increase with the counter electromotive force of the battery, and the current practically remain constant.

The active material of the batteries (particularly the pasted plate batteries) drops to the bottom of the cell in the course of time, and after certain periods it becomes necessary to remove the material thus shed, a process called washing the battery.

The battery is usually put up in two, three or four wooden boxes or trays, provided with binding posts for making the electrical connections, hinged grips for handling, and painted with an insulating compound to reduce leakage of current.

A. C. A. Matters

Raymond M. Owens, secretary of the Oldsmobile Company, J. E. Ewing and James Chisholm, a dealer, all of New York, have been proposed for active membership, and John S. Cox, president of the Cheney Automobile Company, Terre Haute, Ind., and John H. Lindsay, Pittsburg, Pa., for associate membership.

The topic for discussion at last night's meeting was "The Motor Vehicle for Commercial Purposes: Its Advantages and Disadvantages."

By the overturning of an automobile in Baltimore, Md., John Jackson sustained a compound fracture of the skull, Harry P. Stone had his arm fractured and Jewett Dyer was severely cut about the head.

Cayuga County has its highways better marked by sign posts than any county in New York State. They had prison labor to employ, and the supervisors' committee in charge of the employment of the prison labor put them to work painting and stenciling sign posts for the county. Each supervisor, in consultation with the highway commissioner of his town, put in an order against the county for all of the sign boards needed in his town, and these were made and delivered to him and erected on substantial cedar posts at each crossing, and the result was that in an amazingly short time the entire county was covered at small expense with a complete system of sign posts.

LESSONS OF THE ∴ ROAD ∴

Extracts from the Journal of a Moto-Girl.

By Herself.

Several years ago, in the "good old summer time," my husband and I caught the automobile fever. To say we had a bad attack of it would be putting it mildly. I was as enthusiastic as he, so when we saw a steam carriage advertised for sale cheap, with improvements thrown in, we naturally had a desire to possess it. The reason for selling given by the owner sounded plausible and his description of the carriage ran like an automobile catalogue, leaving nothing to be desired. And it would "stand without hitching." So one rainy Sunday they ran it over the road from A—— to W——, a distance of about 10 miles. The whole family went out, looked her over and tried to look wise—and she was ours. However, we were very much wiser after we had had it a few weeks. The way we lost parts, broke reaches and lost spokes out of the wheels, would fill a book, to say nothing of a compensating gear that sounded like a lot of tin cans, until we couldn't stand it any longer and got a new one, which cost us $28.

In fact, we never went out with the "thing" that we didn't have a bill to the repair man of from $5 to $10. If any of the men who never have any trouble would like to see those bills, I will gladly show them, as I am going to have them framed and put in the carriage house for future reference.

One evening we took a short run a few miles from our home and called on some friends, among them a doctor. Everything went lovely until we started for home, when all at once the packing blew off the cylinder head of our engine, making us look as if we were taking a vapor bath instead of an automobile ride, much to the amusement of all the small boys in the neighborhood. I got out and walked while Mr. F. pushed the machine back to the doctor's, who said: "I know a man up the road who has built himself a gasoline car and is an expert machinist, and I am sure he will help you out."

Well, he came with a lantern and some tools in his pockets, and he and Mr. F. worked for an hour or more and packed it the best they could under the circumstances. We then started for home, a distance of 5 miles, on a country road, pitch dark. Oh, what a long way it seemed, with little clouds of steam blowing round us. Would we reach home in safety, or would we again be held up with only a few primitive tools with us, and only the feeble light of the side lamps to guide us? Weren't we thankful when we pulled up

in our own driveway? It was truly "Home, Sweet Home," to us.

However, Mr. F. fixed it with some packing he brought home from the factory, and that never troubled us afterward. The next evening this little notice appeared in the local paper: "Chas. Frank, of W——, had quite an experience with a sick horse near Dr. Smith's drug store last Thursday evening."

HOW WE SOLD IT.

We advertised in the Boston papers, and our correspondence all at once was something startling. We were offered everything in exchange, except a coal mine; but money we must have, so when a man came along one day and made us a fair offer we said: "Take it out of our sight and never let us behold it again." We heard from it again, however. A friend of ours, who is an enthusiast, met the old gentleman one winter's day on the Newton boulevard, where there was some fine sleighing. He recognized it at once as our old steam carriage, so thought he would jolly the man a bit, and asked him how he liked it. The man said it was a fine machine, the best to be had, and next winter he was going to put it on runners. We concluded by that time he would have to put it on the shelf.

Would you like to know how we invested again in a gasoline car; how we counted the weeks until it arrived, and how in our haste to see how it worked we went out while the roads were soft, and got stuck so deep in the mud it took three men and a boy to get us out? The engine refused to work entirely, considering it beneath its dignity to do anything but stand still in a case like that.

(To be continued.)

Is the Automobile Practical in a Physician's Business?—Two Years' Experience.

By Dr. Courtney L. Smith.

Theoretical knowledge is good in the matter of automobiles, as in other things, but as an educator a few chunks of practical experience are worth all the fine spun theories in the world.

Two years' use of automobiles in my business has demonstrated to me their value and utility, and at the same time has shown me many of their defects. Having used horses for twenty years in making my professional calls, I learned the annoyance and expense of this style of locomotion, and was therefore ready to look with favor on any form of self propelled carriage. The steam rig first appealed to me as being the most reliable and practical, and two years ago I purchased a carriage of this kind. A year's use, however, showed so many defects in the machine that at the end of that time it was discarded. It was altogether unreliable, and as an aid to business worse than useless. All the accidents common to this style of vehicle, so well explained in previous issues of your paper, fell to my lot, and a few not scheduled in the list, and finding the nervous strain too great I was obliged to part with it. The few smooth going miles that were sandwiched in between breakdowns showed what a pleasure such a rig may become some sweet day bye and bye.

But although aware that since that time many improvements have been made in steam automobiles, and that many of the defects have been eliminated by progressive builders, I still believe that steam is not the most reliable and practical power for the self propelled carriage.

A light runabout gasoline vehicle was my next venture, and fourteen months' almost constant use has tied my faith strongly to this form of power. Troubles have come to me, as they will come to every owner at this stage of the business. Most of the breakages that I have encountered, however, have been slight and readily repaired on the road, and I have a record of 8,000 miles traveled, with one tow home, and that on account of a broken axle.

COST OF RUNNING.

As to the cost of running, a record was kept for the first half of this period and figured out as follows:

Tires	$36.00
Batteries	6.00
Oil and gasoline	21.00
Repairs	50.20
Storage	2.00
Interest on first cost, $675	23.66
Total	$138.86

Cost per month, $19.83.

The past seven months have averaged much less than this, as no extra tires have been purchased and no repairs have been needed, with the exception of slight ones made by myself. However, new tires, painting and some replacing of parts will soon be necessary items of expense.

DAILY EXAMINATION.

Much of my success in running this vehicle has been due to the fact that I am mechanically inclined, and a daily examination of the machine, with numerous minor adjustments and repairs, has often prevented serious breakdowns.

My car is not built for touring, but during the summer a friend and myself made a trip of 400 miles in the same, making fair time and having no trouble, with the exception of stripping the rawhide gears in the transmission. These were replaced with brass, the job being done in an hour's time by the roadside.

The trip was made through Wisconsin, where some sand and many steep hills prevail, and although in some places more power could have been used to advantage, it is a question whether the gain would greatly compensate for the added weight necessary in a higher powered car.

STABLES IN BASEMENT.

Having experienced much discomfort in working about my machine in a cold barn, I have had constructed during the su a room in my house basement to us ing the winter. I find no trouble gotiating the incline to the grade and am no longer worried about the freezing in my coils or jacket, nor tr with cold fingers while oiling up or ing repairs. The cost of the chang trivial in comparison with the build a properly heated automobile stable.

NEEDED IMPROVEMENTS.

My use and study of the automobil demonstrated to me many defects w hope to see overcome at no distant

First, the tire question is ever most, and must be solved before th with the average depth of pocketbo afford to operate a machine day in a out, as he would a horse drawn vehi

The lighter the rig the less will troubles, but all are bound to punctu casionally.

Single tubes can be revulcanized, b without damaging the inner casing rendering them porous and unreliab

Double tubes are apt to rim cut, te puncture more readily than the single need inflating often.

The wire wheel, though strong and ble, must give place to wood or tubu it is impossble to keep the former i sentable shape if used on muddy ro sloppy pavements.

Many rigs are still built without lu space, which is certainly a great def a doctor's use.

Then, too, the box is not easily ren in spite of catalogue statements abo nuts and a thumbscrew.

The bearings of the steering gea altogether too small, and, not bein justable, soon work loose and prov annoying, as a positive quick acting ing mechanism is often a necessi safety.

This fault seems universal, as fa have examined different machines. that is to be used in all weathers, an sloppy and dusty roads, must have t chinery protected also.

At such times I often find the inte my machine covered with dirt, nec ing frequent extensive cleaning, and ing extra wear of parts from grit w into the bearings.

For winter use the air cooled en certainly far superior to the water and I hope to see a light runabout this description, with ample power, the market in the near future.

Chloride of calcium solutions will below the zero point, and our No winters are too severe to use even t lution with safety. In spite of its de find my machine a great time save would now hardly know how to business without it.

The perfectly reliable moderate machine is coming fast, and it will happy day for the busy doctor when rives.

13,000 Miles with a Steam and 1,000 with a Gasoline Carriage.

By E. H. Ellis, M. D.

One pleasant day in April, 1900, after a night of uncanny automobile dreams, I started for a town, 28 miles distant, to ride home in the steam carriage which I had ordered the September previous.

Upon arriving at the factory I passed over my check (a very important function in those days), and went with the demonstrator assigned me to see my carriage. After considerable work with the torch we got proper steam pressure and started for a preliminary spin. The carriage ran nicely, but we soon found we could not keep up air pressure enough to make our journey, so at the suggestion of the demonstrator I went home on the train. Returning the next afternoon I found the leak mended properly, so we started on our journey, arriving home in about two and one-half hours without any mishaps, except to frighten a few people. One lady amused us by ordering her coachman to stop while she alighted and ran behind her carriage and peered at us from the shelter of the rear wheel.

TAKING LESSONS.

The next day I began to take lessons and the barn to get some severe buttings, the noise of which could be heard a long way off, but fortunate for me it was supposed to be the blasting on the metropolitan water works, a short distance away. For a short time in my apprenticeship our neighbors saw our barn on fire about every time we raised steam, but, in spite of my singed hair, I assured them it was all necessary in firing up an automobile.

AN EXHIBITION RACE.

After about six weeks of riding, pumping up air, soldering air tanks, packing pistons, etc., our trotting park management asked two other doctors and myself to give them an exhibition race on Decoration Day. Of course we gladly assented in our "know nothing, fear nothing way." When the day of the race came Dr. H. thought Dr. C.'s safety valve did not blow off less than 350 pounds and Dr. E. thought Dr. C.'s automatic did not close up until "Saturday night," but we were all honest and did no jockeying. Dr. C. won the first heat of a half mile in 1:08 and Dr. E. the next two, and the race in 1:07½ and 1:07¼, which, considering the roughness of the track and the sharp turns, was doing well, and no accidents except a muffler blown off and a few steam joints loosened.

WEAK SPOKES.

About this time I began to find out the weak points in the carriage, and what was needed to make sure of always reaching my destination. Spokes began to break, so it was necessary to buy them by the gross. After a 35 mile run I found sixteen broken in one rear wheel, and they were so near together that in brushing with a friend coming from Worcester the carriage would sway considerably on the curves. After a time I had larger spokes put in, although they continued to break occasionally, which was due to the hub being too short.

On making a call out 7 miles over a very sandy road my pump failed to give water enough, so I would be obliged to jack up the rear wheels and pump, as I had no auxiliary pump, and no water columns. In view of this my next improvement was a hand pump, and I had the engine pump bored out one-eighth of an inch larger also.

WATER GLASS AND CHECK VALVE.

Several times during the summer my doctor friends and myself would arise at 4 a. m., steam up, and by 5 a. m. would be on our way to Boston, 31 miles away, for an early breakfast. We often made the run in two hours, and once in one and one-half hours. Of course that was the time nothing happened. On one trip I broke my first water glass, which was replaced in thirty minutes; all the way to Boston I had a glass full of water and a stuck upper check valve, so for safety I pumped all the time flooding my boiler three times. While in Boston steam went down, then we were able to release the valve, which I soon had removed, putting in hand valves in connection with the water column, and also new fittings for the water glass, as they began to break frequently and did not stop until I had broken fourteen and discovered that the metallic glands and rubber packing, together with improper alignment, caused the trouble. Since then I have not broken over two or three a season.

SHEARING OFF A PIN IN REAR AXLE.

All through the summer we were troubled with a leaky air tank, but my man knew how to solder. Then we began to break balls in our main bearing, especially if adjusted too tightly. We found the cause to be a crooked shaft. One day I had barely steam enough to get home from an adjoining town, and as I got into my yard the fire went out. After quite a hunt we located the trouble in the gauze which had stopped up the gasoline pipe in the boiler. While running down a steep hill a severe application of the brake (the only time I ever knew the brake to do any good or harm) resulted in shearing off a pin in the rear axle, so that after a swift trip to near the foot of the hill the wheel and axle parted company with the carriage and took to the fields; we, of course, stopped right side up and no harm done, except a half hour's delay, and a wire nail mended the difficulty so we could come home all right. At my first opportunity I had the axles taper drilled for a much larger pin.

A VACATION RUN.

It was now about time for my vacation, so I invited my wife to accompany me on an automobile trip to Wareham, Mass., and vicinity, a distance of 80 miles over very sandy roads. Except for the difficulty of getting water every 15 miles, and pumping air, we got along nicely until when in the midst of some woods, 8 or 9 miles from our destination, we heard a note of distress from the engine, which soon became so alarming as to demand an examination. The balls had broken in the connecting rod bearing, forcing off the dust cap, and all the balls were destroyed or lost but two. We were a long distance from a house, but I had come prepared for such emergencies, so placing a stone "soft side up" by the carriage for my wife to sit on and hold the light we renewed the balls, adjusted the cones, and were soon at our destination. Aside from four broken balls in the main shaft and blistered hands from pumping air, we had no further trouble. We carried an extra tire, but never unstrapped it, and our mileage was 600 at the end of our two weeks' vacation.

WINTER EXPERIENCE.

The last part of the fall and the early part of the winter was very mild, so by winding the water pipes with felt I used the carriage until about January 15. Several times the thermometer was at zero. My steam gauge would freeze when the temperature was much below 15°, but we could thaw out by attaching our steam hose to the blowoff and blowing a little steam on the gauge and pipes leading to it. This same hose we used for cleaning the engine and chain whenever we blew off the boiler.

During the past season I had become tired of pumping air and replacing broken balls, so I sent my carriage to the maker and had a heavier engine, with larger ball bearings and a fuel gasoline pump attached, put in, which solved the difficulties pertaining to air pressure and ball bearings, and for the next two seasons our engine bother was reduced to replacing balls, cones and cup about once in 3,000 miles, and overhauling, cleaning and renewing the diaphragm with the same frequency.

THE REVERSE LEVER AGAIN.

The following spring a new man came to work for me. After I thought him proficient I sent him on an errand one day. On returning, as he came across the sidewalk his reverse lever slipped back too near the dead centre, he coasted down the driveway, which is quite steep and up a slight grade, with a sharp turn to the left, into the barn. The carriage stopped with the rear wheels not quite in the barn, he put on steam, which threw his lever back into the reverse, and shot him out of the barn down a steep grade into picket fence, 30 feet away. I came from the house just then, his face bore the expression of a soldier "charging the enemy backward." The crash soon came. A carpenter could not have cut a better gateway through that fence, although the damage to the carriage was only a broken body and chain, with several steam joints loosened.

All through this second season we had little trouble, except occasionally a broken nipple or loosened joint or pistons need-

ing packing. My orders to my man were always to test the engine by raising the wheels and putting on steam before starting out, and twice a week to place the carriage over the pit and inspect all parts liable to become loosened. It is much easier to make repairs in your stable than on the road.

The fuel pump was a great improvement over the old method, as there was only a small amount of gasoline under pressure, so that when making calls the pressure would soon go down to 20 pounds, and steam rarely rise above 200 pounds. I never had my safety valve blow off but twice in the two seasons following, and then it was due to its being worn out.

THE TIRE QUESTION.

The tire question after the first season was easily solved. I bought second quality Hartfords at $8. Some would last for 3,000 miles. If they were punctured the repair kit was used; if that failed "Dr. Norwood's formula of glue and molasses" was a sure cure. One worthless tire filled with this compound lasted for 1,300 miles. I would warn the profession against wearing kid gloves and Sunday clothes when injecting this preparation. They will look as though they had wallowed in a mixture of hot soft soap and molasses candy; also any old air pump won't do. You want a large pump, such as is used for spraying trees.

THIRD SEASON.

My third season was devoid of interest, so far as accidents and repairs go. Of course there were minor adjustments and repairs to be made occasionally, but we became careless about inspecting the engine, and one of the slides became loose, and when nearly home from a long trip it dropped out, breaking a piston rod. However, the other brought us home and saved us the humiliation of a tow.

We had now ridden about 13,000 miles, and never yet had failed to get home on our own power, and were satisfied with our steam carriage. Still, for some time I had felt the symptoms of

A GASOLINE FEVER

coming on, but the fever was slow in developing, as there seemed for a long time to be nothing built, according to my ideas of what a gasoline carriage must be, for a doctor to use successfully in his practice. First, the motor must be air cooled; second, power enough for hills and bad roads; third, accessibility of parts; fourth, medium weight; fifth, luggage room; sixth, solid rear axle, with chain on the outside. After looking about me some I found there was only one carriage in the United States that answered the above requirements, and after visiting the factory I ordered one, which was delivered to me early in September. This carriage has in addition a folding front seat capable of carrying two light persons, which is very handy for a physician, as it is often necessary to carry along a nurse besides his regular attendant.

One fine afternoon the agent came around and we started on a round of calls aggregating 20 miles. After running 10 miles he invited me to take the helm, which I did, running carefully for a mile. At the first house we passed out dashed a big St. Bernard dog directly in front of the right wheel. We went over the dog, describing a half circle going up a bank and down into the road again, just missing a picket fence. The dog was not badly hurt, and the carriage not at all. One of my doctor friends had some fun at my expense, disguising his voice and pretending to be the owner of the dog, which he said had died. He wanted $100 damages, but finally recognizing his voice I told him that if "he attended the dog it was not the automobile that killed him."

The next day, taking four people with me, we made a 40 mile trip, returning after dark without a mishap.

NOT A SINGLE ROADSIDE REPAIR.

I have now run this gasoline carriage 1,000 miles and have never made a roadside repair, and once only has the engine refused to go. One day it started hard and stopped before we reached the street. Repeated crankings failed to start it, and it occurred to me that it might be the spark plug, as about a week before a friend came up to look at the carriage, and when we attempted to show him how easy it would start, there was no response. Then we looked over the wiring, which seemed all right; then the contact points, and finally my man took out half of the spark plug, while I was away a few minutes, and put his finger down and felt of the other wire, bending it away, and this proved to be the trouble with the spark plug. We had decided it must be the carburetor. So for safety started to turn off the gasoline, but found it had not been turned on, although my man said he had turned it on. The above is practically all the trouble I have had with this carriage in 1,000 miles' road experience.

A LIGHT REPAIR BILL.

I have never had a bolt loosen, have only adjusted my slow speed once, the high speed twice, the chain twice, the crank shaft bearing twice and broke one binder bolt in my high speed clutch by putting on "too much muscle." My repairs have cost to date:

Services of mechanic on spark plug	$0.38
Two binder bolts for high speed clutch	.10
Telephone message for same	.40
Total	$0.88

I have had the belt on the fan rip, which five minutes repaired, and have another in reserve. This carriage is fitted with Dunlop double tube tires, which have never given any trouble so far. It weighs 1,300 pounds and is equipped with two brakes and side steering. I do not think wheel steering is desirable, except on touring cars or on carriages weighing over 1,600 pounds.

THE CHAIN QUESTION

is important. On my carriage the a roller—is on the outside of the such a position that the mud d strike it, and it is only a ten min to replace or repair. I know of carriages whose chains are so situ it takes two men an hour to repair place them if anything happens.

STEAM VS. GASOLINE.

In conclusion there are many which make a gasoline carriage n sirable for a physician than steam. sure there are more vibration ar noise, but there are also greater sa more economy, which is somethin thought of with the high price c line at present, and there are pr only about four things to look a gasoline motor—your electricit plug, carburetor and contact point in a steam carriage you have an with about sixty parts, a boiler, tv matics, a water tank, gauges, pump berless joints and valves, with ev very inaccessible. I formerly beli steam, and steam only, but now af miles of road experience with a automobile I am convinced that if make is selected they are the prop for the busy physician, and will sa much time, and are less expensive road horses; in fact, no physician equipment is complete without an bile.

An Eight Hundred Mile Tri Light Gasoline Car.

By W. C. Cook, M. D.

The purchase of my machine w after a careful review of the exp appearing in The Horseless Age, among owners of several makes as opinions of their own and other n and the testing of and observing th types extant. I finally decided upo weight gasoline machine. It is due chine to say it has been a me great pleasure to its owner for the p months, has occasioned comparativ expense for maintenance and has of 3,900 miles, 415 miles of which most rugged country in Western vania, and the rest made up of int tours, on which I was always acco by my wife and daughter. One tours exceeded 800 miles in leng another 350 miles, and we experie kinds of weather and its attendant ties.

I think a description of one of r would best demonstrate the practica an automobile, for any machine th pable of being used for touring is adapted to any other services. Aft ing several short tours of 150 mil and thereby gaining confidence, one 350 miles was made, with so little that it was followed by one of 800 n description of the latter follows:

The tour referred to was from I

to Niagara Falls and return, the route north being via Youngstown, Conneaut Lake, Cambridge Springs, Erie, Chautauqua Lake and Buffalo. The return was made along the Lake Shore road to Erie, Ashtabula, Warren and Youngstown. Just beyond Youngstown, upon descending a steep, rocky hill, the drain valve on the motor crank case was broken off by striking an obstruction in the road, allowing the oil contained in the case to leak out; yet, although the remaining 6 miles between the point of accident and Sharon were made under the most unfavorable topographical conditions, at the rate of 10 miles an hour, the only additional work required was to use the lubricating pump occasionally. Upon reaching Sharon it so happened that our arrival there was upon a Sunday afternoon, which, of course, precluded repairs. On the following day the crank case was removed and the broken part reamed and bushed, and a pet cock inserted. In doing this work, in the desire to expedite matters as much as possible, the timing device was not properly adjusted, and all efforts to start the motor were futile. After readjusting several times, and still being unable to start, a telegram was sent to Pittsburg for an expert to come out. Thirty minutes after his arrival he had the motor going. This incident showed the importance of thoroughly understanding your machine.

After leaving Sharon all went well, until, when going down a hill into Meadville, I lost the chain with which the motor is started. This is another preventable accident, and was due to the fact that on descending long and steep hills it is my custom to throw out the clutch, shut off the gasoline, pull out the circuit plug, and thereby save the batteries and gasoline, and cool the motor. I usually allow the machine to coast if I see the road is clear and the machine controllable by the brake; before doing this, however, I invariably test my brake at the top of each and every hill. When near the bottom of the hill I insert the circuit plug, turn on the gas and throw in the clutch, which allows the momentum of the machine to start the motor. The loss of the chain was not discovered until I had occasion to stop at a store for refreshments, and in trying to start the motor I found the chain missing. A bicycle chain being unobtainable at that place, the question of how to get to a town where we could procure one presented itself. Finally the machine was pushed to the top of a small hill, some 50 feet distant. After giving it a push and jumping in the motor was started by the momentum of the machine, and was kept going until a bicycle store was reached. A chain was procured for 50 cents, and we had no more trouble from that source.

Sixteen miles out of Erie the motor stopped suddenly. Upon turning the crank handle I found I could get no compression, showing the trouble to be in the inlet or exhaust valve. On removing the inlet valve it was found to be broken. This illustrates the importance of carrying extra valves. Had I had an extra valve the trouble could have been remedied in five minutes, and the machine would not have had to be pushed into an orchard nor we have been compelled to take a street car into Erie, where an inlet valve was borrowed from an owner of a similar machine. Returning to the orchard we replaced the broken valve with the new one, and triumphantly reached Erie at the rate of 14 miles an hour.

The trip was continued from Erie over very dusty roads to Lake Chautauqua. I had run out of lubricating grease, and, being unable to procure more of the same quality, axle grease was used. Leaving Celeron we arrived in Buffalo that night without any more mishaps, except the difficulty of finding our way into the city over sandy roads. After visiting the factory, where we had the machine looked over, readjusted, etc., all of which was courteously granted by the manufacturer, we left Buffalo, covering 150 miles of level road, which was a most delightful experience when compared to trips over the hills of our home city. The entire trip from Buffalo to Niagara Falls, back to Buffalo and Erie, to Ashtabula, to Warren, to a point between Warren and Niles, was made without putting a wrench to any part of the machine. Then it was noticed that the motor commenced to miss fire, and soon stopped. For several minutes I was kept guessing what could have happened after it had acted so nicely. The spark plug was examined and found all right; the trembler was also looked after, and no fault could be found with it. Puzzled to know where next to look, my eight year old daughter questioned me as to the amount of gasoline. After investigating this point I found the gasoline tank dry. The laugh was on me. My stupid blunder was remedied by buying a quart of gasoline from the occupants of one of a dozen houses scattered along the railroad track. This carried us to Niles, where I filled the tank, vowing this should not happen again.

Within 3 miles of Youngstown, it being dark, we found the roads quite muddy, owing to a recent heavy rainstorm; the machine skidded dangerously near the car-track, and it was with the utmost caution that we arrived safely at the hotel. The distance covered this day was 108 miles.

The next day being Sunday and the roads still muddy the start was not made until late in the afternoon. Arriving at Economy at 7:30 p. m. the lamps were lighted, and the run made into Pittsburg after dark, over the roughest and hilliest portion of our trip, at the rate of 12 miles an hour. This feat could only be accomplished safely by one knowing the road thoroughly.

One noticeable feature in connection with the trip was the absence of frightened horses and frightened drivers along the Lake Shore. As soon as we struck inland our troubles with the horses began. This proves that it will only be a few years until horses will become accustomed to automobiles and motoring will become more enjoyable and less dangerous. In all my travels I have never yet caused a runaway. I find that I receive the appreciation and thanks of drivers for stopping my motor until they have driven past. I not infrequently stop my motor, get out and lead horses by, especially if the occupants of the wagons or buggies are women or children.

In all the 3,900 miles traveled I have spent no money on my tires, having had but two punctures, which were caused by nails and were easily repaired in half an hour. Never having had intimated to me that a jack was necessary, I, of course, did not carry one. However, I would advise every motorist to carry one, as the cost is small, only $2. My first puncture occurred on a boulevard, and I was obliged to call two bicycle riders to my aid, and while two of us lifted the machine the other jacked it up with rocks. Next morning I bought a jack and am now prepared for emergencies. I expect my tires to last all of next season. With the exception of one cut, which I shall have vulcanized, the tires are still good. They have been pumped up only once since I got the machine.

Purchasers of automobiles should bear in mind one important fact, that it is advisable to select a machine the working parts of which are accessible in case of accidents. Many automobiles give one the impression that the makers evidently never expect an accident; but when a machine breaks down along a country road one realizes what it means to have a machine the works of which are not "getatable."

Automobile Experiences of a Country Doctor.

By Dr. M———.

Toward the end of 1901 you published an article of mine entitled "Three Months' Use of a Steam Carriage," by a Country Doctor. Well, the same little carriage with which this experience was had continued to be used until the snow came, when difficulties of another sort were encountered. During the first snowstorm of the season I had a hurry call to a distant part of the town and started very confidently on the trip with the steamer. The snow was falling very fast, the sensation of riding over a soft cushion was very novel, and there seemed to be absolutely no trouble at first. But when I arrived at the top of a very high hill where the north wind had gotten in its work, and the sleet began to drive into every crevice of the vehicle, things began to look differently. The depth of the snow caused the engine to work harder, and this resulted in a greater demand for steam. At this point the cross head pump failed to supply water fast enough, and when the auxiliary pump was called into commission it was found to be frozen. Fortunately we were on the top of a hill and it required but little effort to coast to the bottom and run to a nearby

house. The good landlady came to our relief with a tea kettle of boiling water, and we soon had the hand pump thawed out and working nicely.

But some further exasperating events were to follow. We encountered a number of other hills, and within 10 rods of the place to be visited a second freeze up occurred. By this time the water supply had become nearly exhausted. Well, I just let the machine stand right where it was, supposing that I had the fire turned out, and proceeded to make my call, which lasted perhaps twenty minutes. When I came out what do you suppose had occurred? The fire had been turned out, sure enough, but a leak in the burner had not, and the little flame therefrom had not only evaporated all the water but had made a sieve out of the boiler as well. This terminated my automobile experience for the winter.

About the middle of April, 1902, the carriage was put into commission again, having had during the winter months the benefit of about $50 worth of repairs. A very brilliant idea had occurred to me during the time my machine was laid up, viz., to have the engine and chain encased in a sheet iron cover. It looked beautiful and met the approval of my mechanical friends. But, by the prayers of Mohammed, it led to an experience which will leave a lasting impression upon my memory. The first few trips of several miles only caused me to congratulate myself upon having devised such an indispensable improvement in automobiles. About that time I invited my daughter to a short ride. We had proceeded only about a mile when something happened. Investigation showed the sprockets to be out of line and the chain in several pieces and all of the parts pocketed in that case! There were only twenty bolts to remove to get at them, and I had no block and tackle to hoist the machine up the side of a tree to get at the bolts; but after forty-five minutes of work the task was accomplished and we were ready to go home and wash up.

After I had had four experiences of this kind and the desire to try an explosive motor had taken possession of me, my little steamer was cleaned, the looseness in the joints taken up, then driven 50 miles without incident or accident and finally sold and a new gasoline vehicle purchased.

It was just a year from the day of purchase of the steam carriage that my new gasoline vehicle arrived. I did not get the particular vehicle that I had always had my mind on, as there was just about $250 too much price on it; but it is possible that the multiple cylinders would have been rather too much for an amateur to handle without any knowledge of the operation of this style of vehicle except that obtained through the columns of THE HORSELESS AGE.

My motor adviser (Mr. Mills) and myself met the man of whom the vehicle was purchased at a place located 35 miles from my home, and assumed charge of the vehicle after having received a few instructions in the handling of this particular machine. Mr. M. having a theoretical knowledge of such machines seated himself behind the steering wheel and we moved off very slowly. As he became more confident in his control of the vehicle we traveled at nearly 4 miles per hour, and later faster. When he had become quite expert in the handling of the levers I thought it quite opportune for me to change places with him. The change was made, but I found it rather difficult to change from low to high gear and it took me so long to get the gear shifted that the motor laid down before it was accomplished. This gave Mr. M. considerable experience in starting the motor. Finally I caught on how to change the gear and then we scalloped along the road in great style for about 2 miles. We were very considerate of teams and trolley cars and came to a full stop each time we met either. We made those 35 miles in just six hours.

The next morning an account of stock was taken. The machine was an 8 horse power single cylinder one, with shifting gear transmission, two speeds ahead and one reverse, rotary circulating pump and a generous gasoline tank, the whole loaded on a stout frame supported on 32 inch wire wheels, shod with 3 inch tires.

The following morning an attempt was made to operate the machine unassisted, and I soon became acquainted with its eccentricities. It has been in constant use from July 27, 1902, to December 24, 1902. The breaking of a defective sprocket on the rear axle caused me a delay of four hours for repairs. There were some interesting features connected with this mishap. I had a young man out and was doing some extraordinary stunts in hill climbing, going up some grades of 26 per cent. (gradometer reading), and was getting stalled a few minutes every 10 rods or so, but finally reached the top without the assistance of a hay motor and eventually got home from the 15 mile trip in only 45 minutes over schedule time. That same night I made another trip of 5 miles, but the machine did not work right. The following morning the trouble was located—two teeth were broken out of the sprocket wheel.

I have had one punctured tire, but that trouble was easily taken care of, as I always keep an extra tire on hand. Since the cold weather arrived I have made a 25 per cent. glycerine solution for cooling the cylinder head, and during a period of six days when the temperature varied from 4° to 18° below zero it has never frozen, although the machine is stored in an out building without any heat whatever.

I decided to try the effects of snow on a carriage of this motive power, just to be able to reply to the fellow we met with the cheerful idiotic inquiry, "Where's your auto?" I met him on this occasion and he didn't say much. The machine went through from 4 to 20 inches of sno well, but, of course, not on the hig Recently the exhaust valve once s its seat, but this did not cause any delay.

By pouring boiling water over t inder head before turning the mot I do not find any difficulty in star cold weather. I do not believe in ing. If the engine does not start turns one may as well look up th as to sweat by keeping on turning. always be found. My igniter mec has caused me very little delay.

I was taken to task for a staten my last article with regard to m nomical way of storing gasoline friend of whom I purchase my s He condemned my method and lat me a circular of a very good tank for this purpose. I was just int enough to make a test of the econ my method with the quantity of gas had left over when I stored my n away last winter. Twenty gallon sealed up in the barrel which was the storage cellar, and in the spring I began to use gasoline again I fou the quantity lost amounted to or pints, or less than a quart. I sha tinue to use my friend's barrels a unless he shall have them less wel than at present. I appreciate th that in an open building, exposed sun, the results would have been di

My conclusion is that a good g carriage of any make is a good for any country practitioner if he large territory to cover.

Automobiles in Guadelou

Consul L. H. Aymé, of Guadelou der date of January 24, 1903, wrote t partment of State as follows: "A automobile service has been establis tween this city and the town of Ste This service is the first step tow substitution throughout the colony o mobiles for the archaic stage coache were the only means of land tr The Ste. Rose line began running J 1, and has proved a success. On M two new lines will be established, or this city to Basse Terre and the oth this city to Le Moule. The auto used are of French manufacture, wi oline engines as motive power. T well made, handsome vehicles, and ten passengers besides the chauffe his assistant. The prices charg about the same as for the old coaches."

An ordinance to regulate auto has been introduced in the city co Sioux Falls, S. Dak. It provides shall be unlawful for any such vehic driven faster than 4 miles per hou in certain limits within the city, p a fine of $5 to $50, and prohibits the running at a dangerous rate of spe where in the city or across bridges.

NEW VEHICLES AND PARTS.

The New Crestmobile.

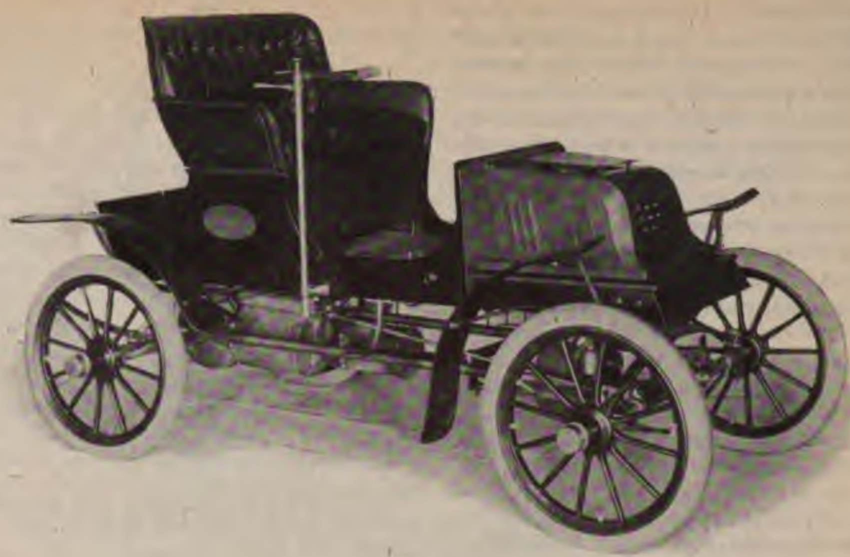


FIG. 1.

The automobile buggy built by the Crest Manufacturing Company, of Cambridge, Mass., during the last season has become well known in the trade on account of its unusual appearance, consisting essentially of a light runabout, with buggy body, with an air cooled motor attached to the front axle, which drove the rear live axle through the intermediary of two chains. This year the Crest Company, while still continuing the manufacture of this runabout, brought out two new models, one weighing 600 pounds and the other 800 pounds. The latter is said to have particularly met the favor of the buying public, and the manufacture of the first has been discontinued. The heavier machine, known as Model D, is the one herewith illustrated and described.

The vehicle has a tubular steel frame, and is of the live rear axle form of construction. The motor is supported by the reach tubes in front, through the intermediary of springs, and the transmission gear is supported by the reach tubes in the rear, being enclosed in a single casing with the differential gear on the rear axle. All the driving parts are thus entirely independent of the body. The wheel base of the carriage is 72 inches, and the track is 46 inches. Midgley tubular steel artillery wheels are used, 28 inches in diameter, and fitted with 2½ inch detachable tires. The reaches of the underframe fasten to a cross beam in front, which is pivoted at the centre of the front axle, forming a fifth wheel construction, and allowing the road wheels to accommodate themselves to all inequalities of road surface.

The motor is a single cylinder, vertical, air cooled one, rated at 5 brake horse power. The cylinder is of 3½ inches bore, the piston stroke is 4 inches, and the engine runs at a normal speed of about 1,500 revolutions per minute. It weighs, complete, 135 pounds, and has a crank case of 10 inches diameter, which encloses the flywheels. The air cooling flanges on the cylinder are arranged vertically, which is claimed to be particularly advantageous for running the engine free, as in that case the heat given off by the flanges causes currents of air to rise vertically, which come in contact with every part of the radiating flanges, thus greatly increasing the radiating effect. Like most high speed engines, the Crest uses jump spark ignition, and is provided with a new design of metallic spark interrupter and a carburetor of the French type.

While in the first models of the Crest Company a number of chains were employed in the transmission, this latest model has a chainless drive. The shaft connecting the engine to the transmission gear is provided with two universal joints, as plainly shown in the elevation of the car-

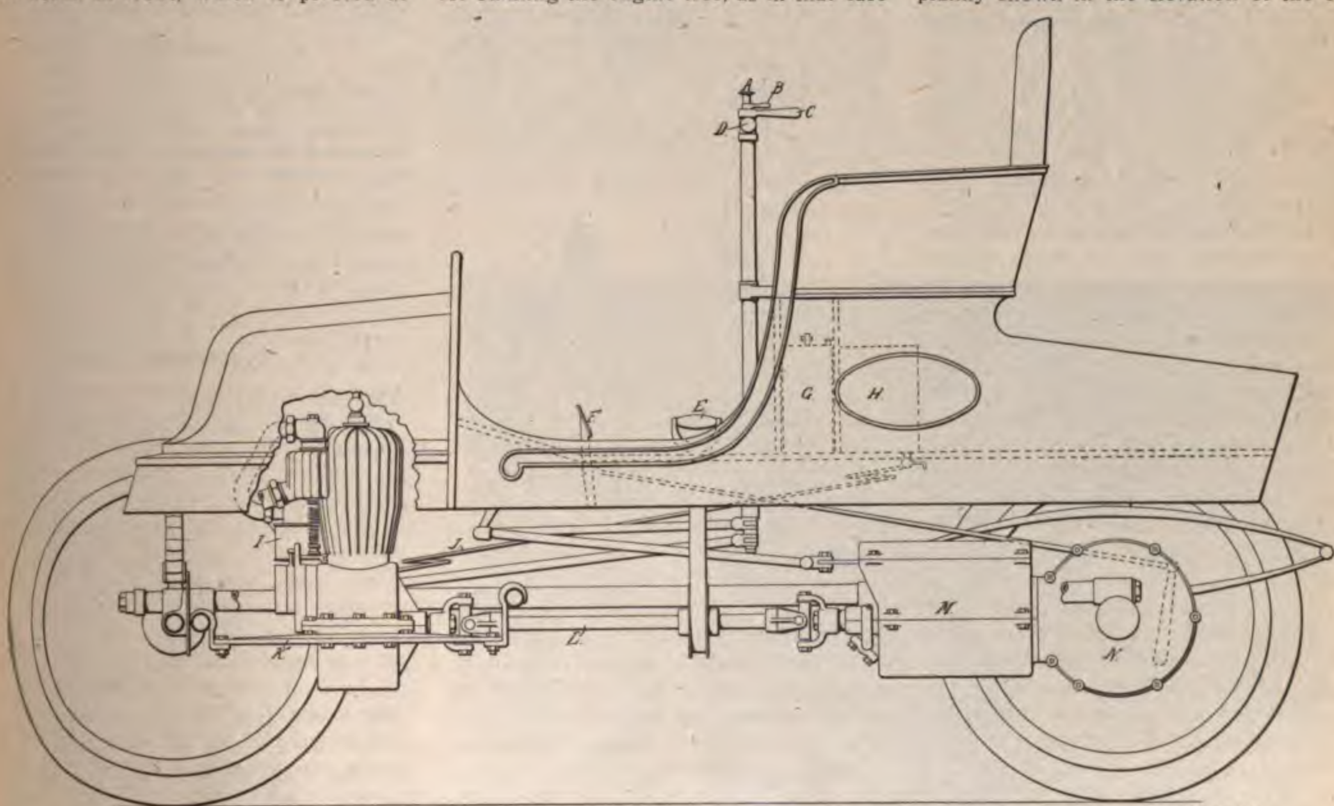


FIG. 2—ELEVATION OF CRESTMOBILE MODEL D.

A, carburetor handwheel; B, ignition lever; C, change gear lever; D, steering lever; E, motor starting handle; F, brake pedal; G, battery; H, gasoline tank; I, carburetor; J, gasoline pipe; K, motor suspension spring; L, transmission shaft; M, change gear; N, differential gear case.

riage herewith. The change gear is described as based upon the differential action of spur gears, and to be without planetary pinions. For the high speed all the gears are locked together by means of a friction clutch, and the drive is then directly from the engine shaft to the rear axle, through a set of bevel gears. The low speed and reverse are obtained by applying friction bands. The gears and clutches are entirely enclosed, and run in a bath of oil, and it is claimed that all adjustments can be made from the outside of the gear case. The large bevel driving gear is provided with a long bearing, having a positive thrust collar. A plate having a similar bearing is attached to the opposite side of the differential drum, and the side thrust of the bevel gear drive is thus fully provided for.

Side lever steering is used, the steering column being placed at the right side of the seat. Above the steering lever are located levers for adjusting the carburetor throttle and the spark timer. Below the steering lever is arranged a lever for controlling the high and low gear. The reverse is operated by means of a pedal, and releases automatically immediately upon the foot being removed from the pedal.

A band brake is located within the housing of the differential gear, and acts upon the differential drum. It is claimed to be positive for both forward and reverse motions, and to have a self adjusting device for automatically taking up wear. It is actuated by means of a pedal, provided with a ratchet and pawl, which hold it in place when pressure is used. The pedal is easily released by a slight pressure of the foot upon its upper edge.

The body is quite long, and has a roomy seat; it can be provided with a detachable tonneau, and when the tonneau seat is not in use the space to the rear of the main seat is entirely available for luggage. Beneath the seat are arranged the 6 gallon gasoline tank, the battery and the induction coil, the battery and coil being placed across the front of the space below the seat, where they are most accessible. The standard color of the body is dark carmine.

The vehicle is geared to make a maximum speed of 25 miles per hour, and to run at 7 miles per hour on the low gear. The capacity on one supply of gasoline is claimed to be 100 miles. The chief claim made for the car is its simplicity, both as regards the machinery employed and the manipulation of the operating devices.

"American" Covered Spark Plug.

The American Coil Company, of Somerville, Mass., have brought out a new form of their spark plug, especially adapted to marine work, in which a brass cover or hood is attached to the brass shell of the plug and completely covers that part of the insulation which extends beyond the shell. This hood is fitted with a hard

rubber bushing at its upper end, through which a rubber covered flexible wire is carried, the rubber covering on the wire making a tight joint through the hard rubber. The hood is secured to the flange on the top of plug with a bayonet joint. This construction prevents moisture or oil from bridging the insulation on the outside of plug, as is often found to be the case with the ordinary plug, especially in an open boat, where a dash of water over the side is liable to cause a short circuit.

The plug is supplied complete with rubber covered wire running through the hood already to connect up. These plugs are fitted with a double insulated mica core and are made with one-half inch iron pipe thread.

Two New Spark Plugs.

The two spark plugs illustrated herewith were exhibited at the recent Chicago Show. The plug shown in Fig. 1 is manufactured by the Detroit Motor Works. It comprises two porcelain insulators, one of the conventional core form, and the other cup shaped and passing over the outer end of

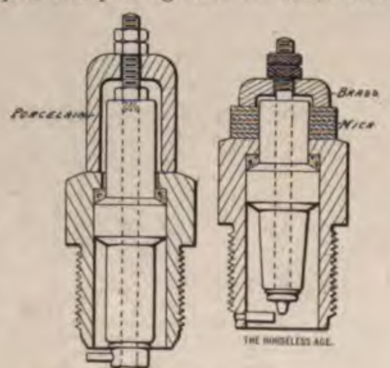


Fig. 1. Fig. 2.

the core. The parts are held together by the central electrode, which is bolt shaped.

The plug shown in Fig. 2 has a combination porcelain and mica insulation. It is manufactured by the Clemic-Hirsch Company, of Milwaukee, Wis. When in position on the engine it has a very stumpy appearance, and is not so likely to be broken by an accidental blow from the hammer or wrench. The method of construction is plain from the sketch.

...COMMUNICATIONS..

Cost of Operation.

Editor Horseless Age:

In 1901 I sent you a statement financial results of an eighteen mon eration of a steam carriage, whi published in your journal under March 13, 1901. This showed a cost of 11 cents, and a cost per m $38. In the fall of that year I pu another carriage, and give below t for maintaining and operating it fro tember 14, 1901, to February 1, 190 distance traveled was 6,500 miles, a little more. The item for depreci smaller than would ordinarily be tl This is on account of my having l carriage practically rebuilt this wint ing put in a new chainless engin pumps, a new steering gear, new sp new indicator, a new pressure tank new burner.

No long trips have been taken, carriage has been under steam every day for a large part of tl During October and November th ber of tires destroyed was very g used more during that time than in previous experience. Tires are 3 in gle tubes, which of late I have l paired by inserting inner tubes. T pears to work beautifully, and economical.

	Total
Fuel	$91.6
Care and small repairs	177.6
Tires	90.1
Shop repairs	191.8
Depreciation (estimates)	100.0
Building insurance	8.0
Total	$659.3

Cost per month (for sixteen and months), $40. Interest charges are cluded. Henry F. Br

A Mysterious Fire.

Editor Horseless Age:

A steam carriage was placed in some time since at 8 p. m. The supposed to have been turned out left entirely alone. The door was There was no fire or lantern in th ing. At about 1 a. m. there was plosion, and upon investigation th line tank was found to be in fla should be much obliged if you wo me your ideas as to how this cou occurred. L. S. Tho

[The only explanation that occu is that the fire was not turned o haps the pilot light remained burni there was a leak in the gasoline ing system, the vapors from whi ignited by the burner at the tim That the explosion should have

so long after the vehicle was placed in the building may be explained by the fact that gasoline vapors will only ignite when mixed with air in certain proportions. If there had been no flame in the building the gasoline could not have taken fire.—Ed.]

An Incorrect Quotation.

New York, February 27.

Editor Horseless Age:

My attention is drawn to a statement which I am alleged to have made, on page 296 of The Horseless Age of February 25. There I am quoted to have estimated "$25 to be a fair average cost of each of my trucks per month."

The statement is fortunately so absurd that I need hardly contradict it, yet I beg leave to affirm that it originated with your reporter.

You also quote me as advocating a truck which could be loaded at the side from the curb. Also in this connection I beg to comment that I expressly stated that this could hardly be done in every case. I simply stated that in a great many cases the backing of trucks is simply done without real necessity. With a longer wheel base of an automobile and the greater unobstructed space between the wheels I believe that it should be possible to load automobile trucks from the side and at the curb.

Arthur Herschmann, M. E.

The Locomobile Touring Car—Corrections.

New York, February 27.

Editor Horseless Age:

We have been reading over the interesting description of our new gasoline touring cars in your issues of the 18th and 25th. However, we wish to call your attention to certain matters.

From your description it would seem that the special lug which is cast on the side of the cylinder is for the purpose of loosening the exhaust valve in case it should become stuck to its seat or the stem of the valve in the guides. The principal reason for using this lug is to make the operation of removing the exhaust valves the matter of a few seconds only. This has always been a cause of annoyance with gasoline engines. With our car is furnished a small tool which makes it possible to loosen the exhaust valve spring and push the exhaust valve upwards and out of the same cavity in which is placed the inlet valve.

One of the important features of the car has for some reason been omitted. This is the connection between the supply of oil to the crank pits and the spark switch. When this (the spark switch) is thrown on the lubricator valve is opened automatically, and when the spark switch is closed the supply is cut off. Thus the engine is only being oiled when it is running.

Before the motor is started the spark is retarded by dropping down a ratchet lever on the dashboard. This connects with the brushes of the sparking device and times the spark so that when the switch is thrown in the motor will start, providing, of course, it is warm and has been running recently. It may interest the readers of The Horseless Age to know that one of our cars has been started after it had been standing twenty-four hours. When the motor is running the lever is kicked up with the foot, so that the spark is advanced, taking place at the top of the stroke. After this time the governor controls the position of the spark as well as acting on the throttle.

J. A. Kingman.

Senator Flood's Automobile Sleigh.

The photograph herewith represents an automobile provided with runners, belonging to Senator J. K. Flood, of Hart, Mich. The machine is described as follows: "The machine rests on two runners in front and is steered by the front runners, just the same as by the front wheels on the automobile. The rear runners are on an axle attached to the under side of the body of the machine. It is propelled by two automobile wheels on an axle below the runner axle. Carriage springs are fastened to the runner axle at the top and to the wheel axle at the bottom and are of sufficient tension so that the rear weight of the machine is carried on the wheels, which gives sufficient traction to propel the machine, which, with the additional weight of the passengers, compresses the springs, causing the runners to rest solidly on the snow. Therefore, owing to the springs, the wheels take up all the unevenness of the road, and may be 6 inches below the bottom of the runner with ample traction. The rubber tires, partly inflated, adhere finely to snow or ice roads, and it does not require 50 per cent. of the power to propel the machine on runners that it does on wheels on ordinary roads. The front runners make a good track for the rear wheels, and the rear runners are close to wheels on the inside. The brake acts just the same on the wheel axle as it does on the automobile.

"Much of the trouble in making the changes from wheels to runners is from the fact that the running gear has to be narrowed from 10 to 12 inches to be suitable for sleigh tracks on country roads."

"Steam Power for Automobiles."

A lecture on the above subject was delivered at the Automobile Club of America on Tuesday evening, February 24, by Prof. John E. Sweet, of Cornell University. Professor Sweet said that he had seen the Stanley automobile engine a few years ago, when it was first brought out, and had at once become interested. It had been his impression that in the engine mentioned too much effort had been made to peel down the weight, that it was not correct to expose the working parts of an engine to the dust and grid of the road, and that something should be done to obtain as complete a balance of the moving parts as possible. He had been urged by a number of capitalists to get out a design of automobile engine on the lines he thought most suitable. This he had done, and it was his intention to tell his audience in what respects his machine had been successful and wherein it had failed.

It was his opinion that as two cylinders were required in any case, the engine might as well be made compound, which would lead to a considerably higher steam

Senator Flood's Automobile Sleigh.

economy. With stationary engines, he thought, the advantage of compounding did not compensate the attendant disadvantages in sizes below 100 horse power, but he saw no reason if two cylinders had to be used anyhow why one should not be made a high pressure and the other a low pressure.

To obtain complete balance with a two cylinder engine, the cylinders of which must necessarily be set at quarters, was impossible, but a fair balance could be obtained by placing the two cylinders at right angles to each other. This arrangement had been adopted in his engine, the high pressure cylinder being arranged horizontally and the low pressure cylinder vertically. The valves employed in this engine were described as piston valves, with plain surfaces, the same type of valve having been in use on stationary engines of his design for about twenty-three years.

All the working parts of the machine were enclosed and ran in a bath of oil, and the cast iron case made a very substantial frame. Special effort had been made to avoid all possibility of parts coming loose. No stuffing boxes were used on the piston rods, the rods being made a ground fit in the cylinder heads. The piston rods and crossheads were made in a single piece, and the connection rod also was made in a single piece; that is, without bearing caps. A large number of holes were drilled in all parts in the crank chamber requiring lubrication, which insured that they received plenty of oil.

The proposition now was how to reverse this engine. The eccentrics had been turned in one part with the crank shaft, so that they could not be shifted, which was not a good arrangement anyhow. It was then decided to reverse by interchanging the admission and exhaust passages, which would allow of backing at a slow speed, this being considered rather an advantage. The object was obtained by means of two common plug valves, with channels cut in them, the two valves being operated simultaneously. The engine worked with a constant cut-off at three-quarter stroke, and, being well balanced, would run as high as 1,500 revolutions per minute. Tests made by Professor Carpenter had shown that the steam consumption varied between 27 and 30 pounds per horse power hour. Professor Carpenter had reached the conclusion that with this type of engine compounding resulted in a gain in efficiency of over 20 per cent.

Professor Sweet said that none of the troubles they had expected had materialized, but where they had least expected trouble the engine had failed. The valves had proved entirely unsuitable for the work, and had been inoperative after only a short time of use. The reversing plug valve had been found even less satisfactory than the main valves.

A vote of thanks was tendered Professor Sweet at the conclusion of the lecture.

...OUR... FOREIGN EXCHANGES

The Thornycroft Gasoline Cars.

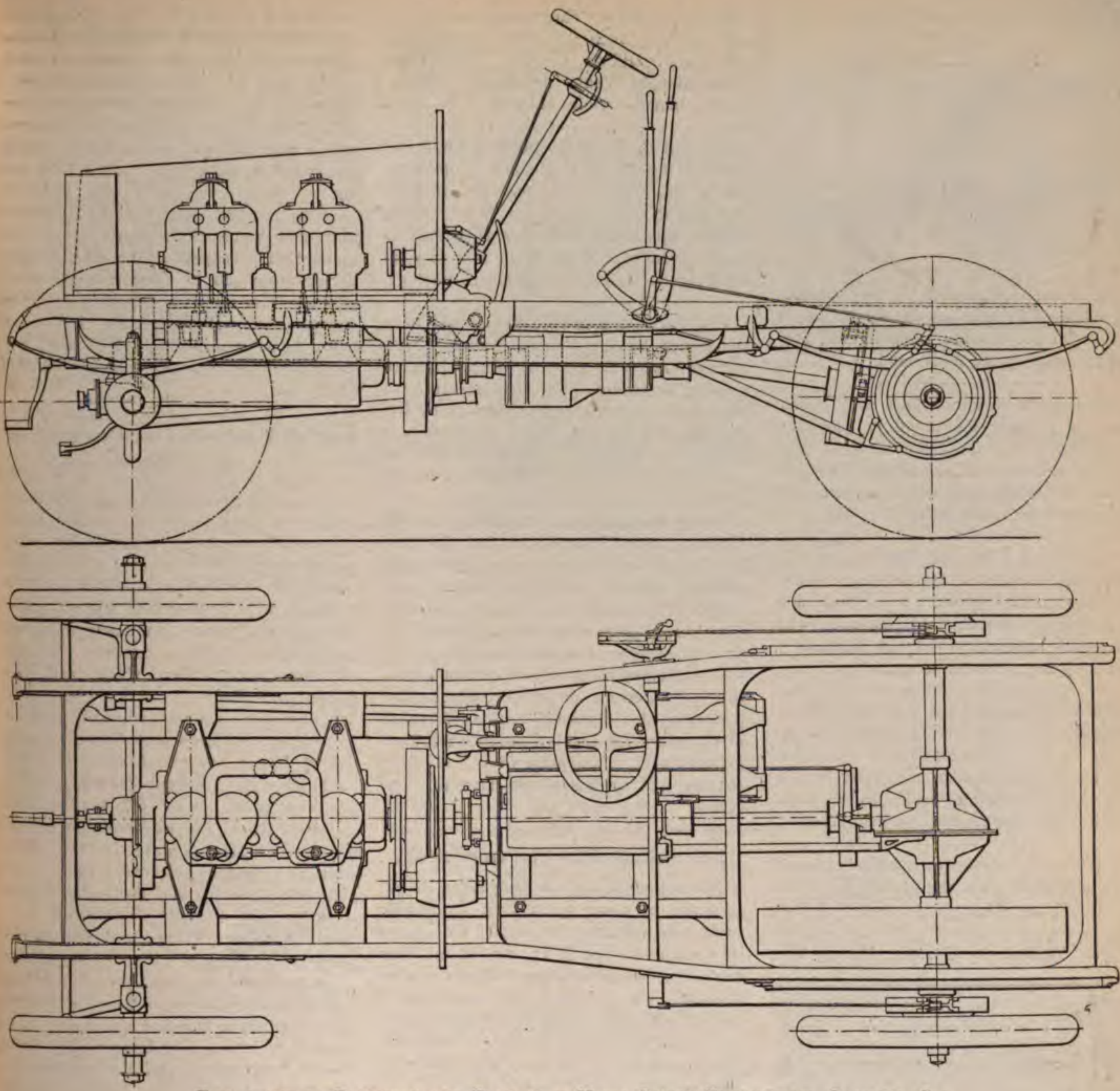
The Thornycroft Steam Wagon Company, well known as manufacturers of steam trucks, have recently taken up the manufacture of gasoline vehicles, and exhibited two styles at the Crystal Palace Show, a 10 horse power and a 20 horse power model.

The general arrangement of the machinery, frame and wheels is well shown by the illustrations. The 10 horse power vehicle has a two cylinder engine, while the 20 horse power car has two two cylinder engines. In other respects the designs are very much alike, excepting that the latter is more substantial than the former. The following description is taken chiefly from particulars supplied by the makers. The under frame is of channel section, pressed from special steel plates one-eighth inch thick. Each member is 2 inches deep on the web at the ends, and 1½ inches wide on the average, but in the centre it is 3¼ inches deep by 2½ inches wide, thus being bellied in order to give strength proportional to the stresses. The advantage of properly designed side members of this nature, as used on many of the best designed cars, over the ordinary parallel rolled bar will be apparent. The engine and gear box are supported on a supplementary frame 5 inches below the level of the main frame, and running the greater part of the length of the car. The two frames are strongly attached to each other. The main frame, it will be seen by reference to the plan, is wider at the rear part. The weight of the under frame complete is about 105 pounds, the length 9 feet 1½ inches, and the width 3 feet ⅜ inch. The bearing springs are semi-elliptic; each one of the leading pair, having a span of 30 inches, is built up of four ground plates, each 1⅝ inches wide. The rear springs have a span of 36 inches, and each contains five plates of the same width. The springs are attached to the axles by bolts in the usual way, and are fastened to the under frame by scrolls and links of manganese steel, a material admirably suited for the purpose by its unique combination of toughness and hardness. The leading springs are fixed at the front end, and are free at the rear end, while the rear springs are free at both ends, the rear axle being held by a radius link connecting the differential gear case with the chain speed gear box, as shown in Figs. 1 and 2.

The wheels are of the artillery type—Clipper-Michelin tires being used. These tires are stated by the makers to stand a working load of 600 pounds per wheel, the air pressure being normally 25 pounds per square inch. The leading axle is of steel tube, 1¾ inches in diameter and

three-sixteenths inch thick. At eac
a steel casting containing the n
pivots, the steering heel being on
vided axle system. The steering
operated by hand wheel, and is of
al pattern. The joints are of the
ball type, and there are spring
taking up severe jars. Circulatin
is cooled by a radiator in front of
and the motor is placed under a b
the usual place, as shown. Th
shaft bears at its rear end a frictio
which also acts as a flywheel. Th
is operated by a foot lever. Be
drive is used in these cars, the
thus no chain gearing. The inte
shaft is fitted with universal joints,
drive to the rear wheels of the c
means of the usual bevel and di
gearing. The gear box is of al
three forward and one reverse s
provided, the highest speed being
drive through the gear box, thus
the countershaft and reversing pi
so that a very silent drive is obtai
gear wheels are all of steel and
ened, the teeth, of course, being
cut. The ignition regulating and
or controlling levers are on the
pillar. The change speed har
which is on the right of the driv
pulled right back gives backwar
to the car. When set forward
quired distances, the first, second
speeds are obtained. Band brak
ted to be used on each driving
occasions of emergency. Th
clutch is driven through a foot
motor being released when the
pressed down. Another pedal
band brake to the fore and aft tra
shaft.

The engine for the 10 horse
is, as stated, of the double cyli
the 20 horse power having tw
double engines. It is placed ve
the usual manner. The cylind
inches in diameter by 4⅜ inches
normal speed being 900 revolu
minute; but this can be accelerat
revolutions per minute. The
with their water jackets are ca
Ramsbottom rings are used, an
necting rods are of double T s
cast steel. The gudgeon and
bearings are bushed with phosph
The cranks are set at 180 degree
balance the engines. The end b
each 2¾ inches long by 1⅜ in
ameter, so that good bearing
provided. The pump for circu
cooling water is worked by a
on the forward end of the crank
crank chamber is of aluminu
completely enclosed. Lubricat
the splash oil bath method. T
of the crank chamber can b
without affecting the main bear
tomatic admission valves are us
eduction valves are actuated in
way from the half speed shaft b
cams. A centrifugal shaft g



FIGS. 1 AND 2.—ELEVATION AND PLAN OF 20 HORSE POWER THORNYCROFT GASOLINE CAR.

used, and regulates the speed of the motor by throttling the mixture.

Messrs. Thornycroft have taken into consideration the advisability of using mechanically actuated induction valves, which at present are being largely introduced. They are, however, of opinion that the complication entailed by their adoption is not sufficiently compensated for by the advantages gained, and they therefore prefer to adhere to the spring controlled automatic valve for light engines. The arrangement for examining the valves is very simple, as by removing one cover the whole are accessible. Electric ignition is by a small dynamo, or by coil and battery system. If a dynamo is fitted, the motor is first started from the battery. If the dynamo be used with the coil, the motor is first started from the battery which is automatically cut out, and the dynamo is switched on as soon as the motor has reached the required speed. This insures the cells lasting for a very long time. The rear axle is in two parts, each of which is connected with a fore and aft drive by beveled gearing and differential gear in the usual manner, both being enclosed in a gear case. The driving axle is not thus subject to any bending stresses, these being taken by the tubular shaft. The bearings of the axle are of phosphor bronze, and are of considerable length, being carried within the tubular shaft. They are automatically lubricated from the differential gear case. The beveled pinion at the end of the fore and aft driving shaft is not overhung, as is frequently the case with cars of this description, but is provided by the main bearing. The rear axle is trussed, the whole thus forming a very stiff and firm construction.—*Engineering.*

A steam motor fire engine with a pumping capacity of 400 gallons a minute is to be acquired by the Brighton (England) corporation.

Entries for the proposed motor car race from Paris to Madrid had on February 17 totalled up to 225. It may be remembered that the entries for the Paris-Berlin race were 171, and those for the run to Vienna 218.

Among the cars entered in the Paris-Madrid race are the Mercédes, six cars; Panhard, twelve; Ader, eight; Mors, ten; Renault, ten; De Dietrich, nine; Décauville, four; Pipe, four; Darracq, eight; Clément, six; Gladiator, three; Richard, eight; Passy Thellier, four; C. G. V., four; Serpollet, six; De Dion, eight, and Hotch-

kiss, Corre and Prosper Lambert, four each.

The total attendance at the Crystal Palace Show is stated to have been 122,081 persons.

Carl Benz has resigned the management of the Rheinische Motoren Fabrik, of Mannheim, and has been succeeded by his son, Eugen Benz.

The Sport Commission of the Automobile Club of France has agreed to July 9 as date for the Gordon Bennett race, provided it takes place in Ireland.

The imports of automobiles into British ports in January amounted to 540 cars, compared to 173 for January, 1902. The value of the imports was $835,560, and the value of British automobile exports for the same month, $84,380.

The Veloce Club and Club Automobilisti d'Italia separated on February 3 and the automobile branch formed a new Automobile Club Italiano (Milan), with temporary headquarters at Via Manzoni 3, and Auguste Massoni as president.

The Nice meeting has been refused authorization by the French authorities, so far as the Circuit du Sud-Est is concerned, which consists of a road race from Nice to Aix, Senas, Salon and back. In like manner the Pau road race is also prohibited.

The touring section in the Paris-Madrid race will start from the clubhouse of the A. C. F. on May 12, and will follow the following itinerary: Paris, Pougues, Royat, Viaduct de Garabit, Murat, Vic-sur-Gère, Padirac, Rocamadour or Alvignac, Cahors, Agen, Biarritz, Saint-Sébastien, Zaraus, Bilbao, Vittoria, Miranda del Ebro, Burgos, Venta de Banos, Valladolid, Salamanca, Avila, Madrid.

The bill of the Hon. Scott Montagu to legalize the Gordon Bennett Cup race, which was introduced into the English Parliament and passed its first reading without opposition February 21, is said to have the support of the Irish Secretary, of the Premier, and to be certain of passage.

The Paris-Madrid race has at last been sanctioned by the French Ministry, with certain reservations as to precautions to prevent accidents. The contestants have been given starting order numbers by lot, the first five to start being a Dietrich, a Panhard, a Renault, a Decauville and another Dietrich. Mr. Harkness starts ninth.

At the meeting of the Automobile Club of France on February 10 last the proposal to hold a contest for motor mail delivery wagons was condemned; the proposed competition of storage batteries abandoned; determination of the date for the competition of motor fuels postponed; it was decided to carry out certain practical investigations on road traction proposed by M. Hospitalier and to establish a laboratory for making engineering tests for members. A contest of anti-skidding devices was proposed and favorably received.

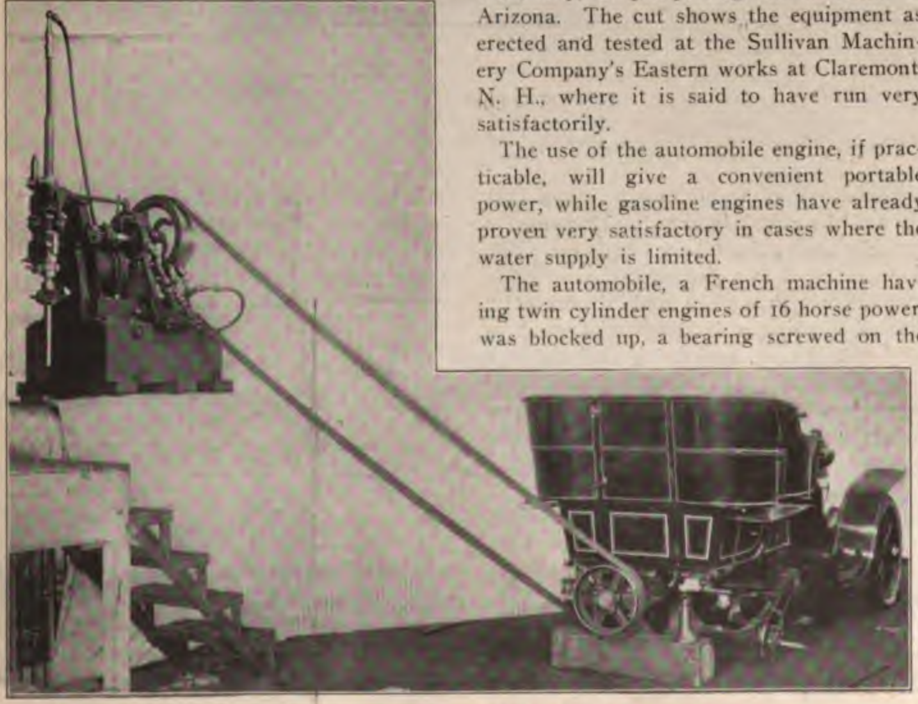
The Automobile in Prospecting.

The accompanying cut illustrates an experiment of some interest to automobile users, which is about to be tried by Charles D. Cook and Capt. J. H. Hassell, of New York city, in prospecting for minerals in Arizona. The cut shows the equipment as erected and tested at the Sullivan Machinery Company's Eastern works at Claremont, N. H., where it is said to have run very satisfactorily.

The use of the automobile engine, if practicable, will give a convenient portable power, while gasoline engines have already proven very satisfactory in cases where the water supply is limited.

The automobile, a French machine having twin cylinder engines of 16 horse power, was blocked up, a bearing screwed on the back end of the frame, a shaft conne[...] the universal coupling regularly used [...] machine, and the pulley placed on t[...] of the shaft. It was necessary to [...] the wheels and drop the gear box in[...] to get the shaft in position. As the [...]mobile was equipped with a friction [...] it was not necessary to attach a loo[...]ley.

With the three combinations of [...] gears and the use of the spark contro[...] the machine the speed of the shaft c[...] varied from 400 to 1,600 revolutio[...] minute. The engine is belted to a [...] Sullivan diamond prospecting drill, [...] has a capacity such that it will brin[...] 15-16 inch core of ore or rock from [...] of 500 feet.



THE AUTOMOBILE IN PROSPECTING.

List of Exhibitors at the Phi[...]phia Show.

The following is a list of the exh[...] and their exhibits at the second [...] Automobile Show in Philadelphia, [...] opened at the Horticultural Hall o[...]ruary and continues until March 7:

Diamond Rubber Company, [...] Twentieth Century Manufacturing [...]pany, lamps; Gibiney Brothers, Fi[...] Firestone tires; Hart Cycle and [...] Company, Racine motors and [...] launches and Thomas Auto-bi; St[...] Anti-Friction Equipment Company[...] Ed. B. Ryder, automobile caps; Do[...]table Electric Assistant Company, [...]ies and spark plugs; Charles Sc[...] bodies; Rose Manufacturing Co[...] lamps; Charles Krouse, motor [...] Rainier Company, electric wagons[...] Wormley, Shelby and Sandusky [...] vehicles; the Sterling Automobile [...]pany, Rambler, Reeber and Dury[...]riages; Blaylock & Blyn, furs; [...] City Automobile Company, Olds[...] and Toledos; American Darracq A[...]bile Company, Darracq carriages; Maltby, Winton; John Wanamaker, [...]baker, Searchmont and Cadillac; [...] Brothers, Autocar, St. Louis, F[...] Orient, White, Pierce, Knox, N[...] and Waverley; J. C. Brandes, Cude[...]line vehicles; Pennsylvania Elect[...]hicle Company, Conrad Gasoline [...]lumbia electric vehicles, Edwin [...] Sands, Moyea; William Rudolph [...] Distance, Packard and American; Corbin Company, Jones-Corbin an[...]mobile; W. W. Gawthrop, Elmore[...] Vehicle Power Company, gasoli[...] Thompson Auto Company, gasoli[...] A. Krouse, Thomas automobile; [...] Co., automobile. In addition [...] have been taken by a number of [...]bile publications, including THE [...]LESS AGE.

The Des Moines (Ia.) Automobi[...]pany has given a chattel mortgage [...] Paul and others covering its prop[...] West Ninth street to secure a [...] $3,300.

The Soames Gasoline Car.

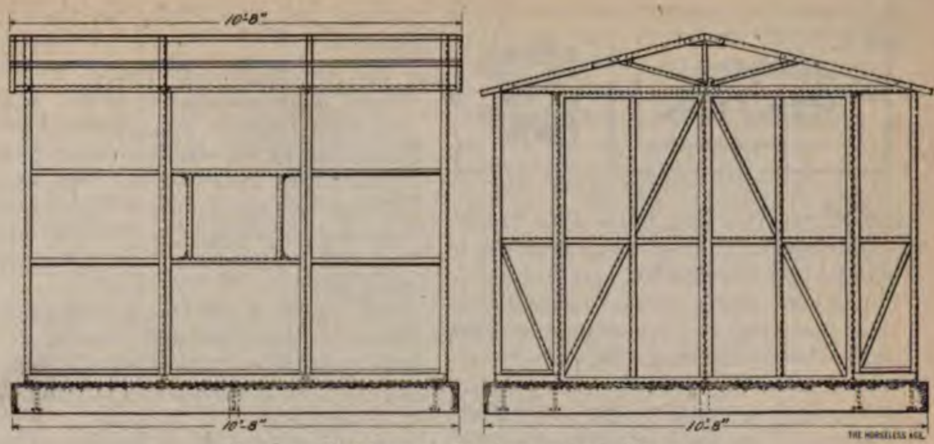
Among the new vehicles at the recent Crystal Palace Show was an 11 horse power gasoline car, manufactured by the Langdon-Davis Motor Company, Ltd. An illustration of the chassis of this car (from a photo taken at the show) appears herewith. The vehicle has separate frames for the body and the propelling machinery, both frames being constructed of angle iron, and supported from the axles on leaf springs.

The motor is a two cylinder vertical one, running at from 800 to 1,000 revolutions normally. It is provided with a governor acting on the admission. The air inlet is coupled up to the gas inlet by spring connections, in such a way that when the control handle is moved one way it regulates the quantity of gasoline, and when moved another way causes additional air to be admitted to the cylinders. When the gasoline throttle is entirely closed a full charge of cold air is admitted to the cylinders. The cooling water is circulated by means of thermo-siphon action.

The change gear varies in design considerably from the usual practice with this type of gear. The transmission shafts are placed transversely across the car, the bevel gears being introduced between the engine and the change gear instead of between the latter and the rear wheels. A double pair of bevel driving gears is provided, and the reverse motion is obtained by changing from one bevel to the other. The change gear provides four speeds, and the teeth of all the gears remain always in mesh. One of the transmission shafts is provided with a deep keyway and a set of sliding keys, by means of which any one of the four different gears on that shaft may be locked to it. The keys are so arranged that when they are moved along face of the shaft, there being an inclined plane at each end of the key. The power is transmitted to the rear axle by means of two chains placed side by side.

On the clutch shaft is fitted a brake, consisting of a slightly coned gun metal disk, which can be clamped between a pair of steel shoes drawn toward the axis of the disk. There is also a set of brakes on the two rear wheels, which are claimed to be of the double acting type. The rear axle, which is a live one, is mounted in long, ring oiling bearings, as used on electrical machinery. With the solid rubber tires, and the unusual arrangement of the parts, the appearance of the car differs considerably from that of standard types.

In the interest of good roads a State wide tire law should be passed, simple in its requirements, positive in its enforcement and going into effect two years after its passage, in order to permit every wagon user to have ample time to adopt wagon tires to the new law in the interest of road maintenance.



Keasbey & Mattison's Automobile House.

The Keasbey & Mattison Asbestos Automobile House.

A novel type of automobile house, which is both fire proof and water proof, is being placed upon the market by the Keasbey & Mattison Company, of Ambler, Pa. The house is made in three sizes as follows: 10 feet by 10 feet, 10 feet by 13 feet 4 inches, 10 feet by 16 feet 8 inches. Two views of the smaller sizes are given herewith. The houses are built in individual sections 3 feet 4 inches wide and 7 inches high, which can be put together with a screwdriver and wrench. The roof is covered with No. 26 black iron and the doors are covered with No. 26 galvanized iron. The entire framework is made of angle iron, mostly 1½x1½x⅛ inches. The walls are covered with asbestos board three-sixteenths inch thick, which is bolted to the framework with three-sixteenth inch stove bolts, spaced 6 inches.

A. A. A. Affairs.

The new racing rules were recently submitted in printed form, but they are not to be made public until after they have been passed upon by the various clubs that compose the organization.

Trade Literature Received.

Flash Boilers.—The Barton Boiler Company, of 4212 State street Chicago.

Gasoline Motors.—The Holland Auto Company, of 60 Van Winkle avenue, Jersey City, N. J.

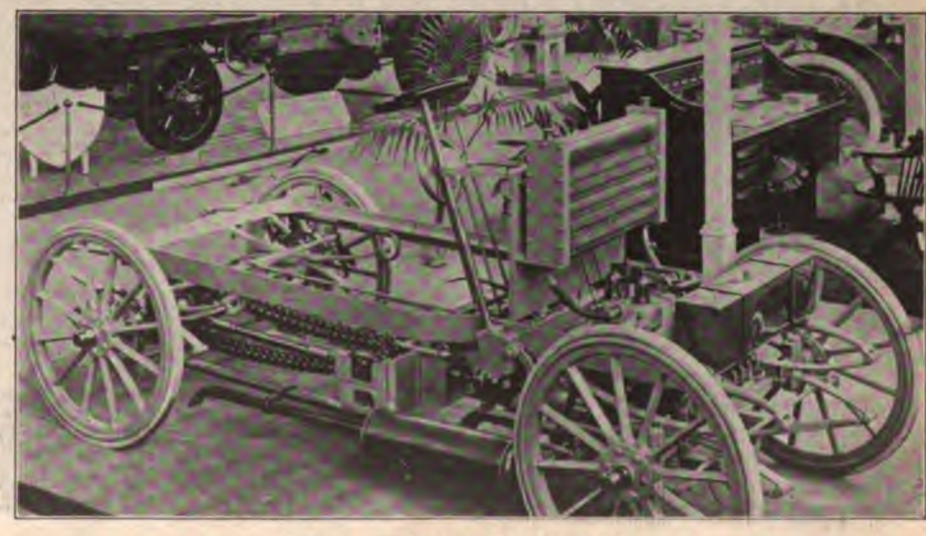
Power.—Motor and Transmission Gear Catalogue of the National Automobile and Motor Company, of Milwaukee, Wis.

Mueller Induction Coils for Gas and Gasoline Engine Ignition.—The Induction Coil Company, of Milwaukee, Wis.

National Electric Vehicles.—National Motor Vehicle Company, Indianapolis, Ind.

The Sherwin-Williams Perfect Method of Carriage Painting.—The Sherwin-Williams Company, 100 Canal street, Cleveland, Ohio.

Norman Deveaux, E. J. McKinley and T. Emch are defendants in a suit for $5,000 brought by Louise Smith, Toledo, Ohio, as the outgrowth of an automobile accident at Bellevue, on September 23, 1902, when she claims her horse became frightened by their automobile and that she was thrown to the pavement, sustaining a fracture of the left clavicle and internal injuries.



Chassis of Soames Gasoline Car.

MINOR MENTION

It is reported that Dr. C. W. Russell, Springfield, Ohio, will form a company to manufacture automobiles.

Frank G. Clark will be manager of a new company to manufacture gasoline automobiles at Lansing, Mich.

E. H. Corson, manager of the proposed motor cycle tour from Boston to St. Louis, says that he has received 500 entries.

The Tioga Automobile Company, Philadelphia, will erect a showroom and repair shop at Tioga and Broad streets.

The Reading Automobile Company, Reading, Pa., have leased property at Cherry and Fifth streets for a showroom and storage.

Six patents on a power propelled agricultural machine were granted to David Lubin, of New York city, on February 24.

The Banker Brothers Company formally opened their "automobile palace" at 629 to 633 Broad street, Philadelphia, on February 26.

The Berkshire Automobile Club, Pittsfield, Mass., has just issued a printed constitution and by-laws handsomely bound in a paper cover.

Plans are being made to reorganize the Woodruff Automobile Company, Akron, Ohio, to manufacture motor vehicles on an extensive scale.

Mrs. Paul Schabert is reported to have driven her automobile 14 miles through the snow just after a recent storm from Derby to Bridgeport, Conn.

The Treasury Department has ruled that automobiles shall be admitted without paying duty for a period of four months on their owners furnishing a bond.

We have received a copy of the proceedings of the fourth annual supervisors' highway convention of the State of New York, held at Albany, N. Y., January 20 and 21, 1903.

The Electric Vehicle Company has taken a fifteen year lease of the building on Stanhope street, Boston, formerly occupied by the Edison Electric Illuminating Company.

The Cleveland Driving Club has named August 5 as the date for the second Fournier-Winton race at Cleveland. The first will take place at the Empire State track July 25.

A. E. Davenport has taken the agency for the Grout automobiles for North Adams and Western Massachusetts. He will receive one of their passenger cars March 1.

The Dayton Electrical Manufacturing Company inform us that the circuit indicator, speed regulator and improved storage battery upon which Vincent G. Apple has just taken out patents will be manufactured and placed upon the market by them soon.

The exports of automobiles from the United States during the month of January were valued at $114,374, compared to $27,311 during the same month last year.

Charles H. Benedict and Ben Burtiss will open an automobile and storage station at Schenectady, N. Y., and during July and August will have a branch at Saratoga.

The House of the British Parliament on March 2 passed the third reading of the Hon. John Scott Montague's bill authorizing the Gordon Bennett cup race to be run in Ireland.

The American Motor Carriage Company, of Cleveland, have been at work for several years developing a storage battery, which will be placed on the market this year, they inform us.

Heineman & Pratt, of Los Angeles, Cal., have issued a road guide to the vicinity of that city. The firm operates a garage, and has the agency for the Autocar and the American electric vehicles.

U. S. Senator Mason, from the Committee on Post Offices and Post Roads, on February 18 reported the Post Office Appropriation bill, in which authority is given to appropriate $100,000 to employ automobiles in the postal service.

The Automobile Storage and Repair Company, of Washington, D. C., will remove to their new building at 1319 L street on April 1 next. This building will have two stories, running back 164 feet and comprising 6,000 feet of floor space.

The Tivy Cycle Company, Williamsport, Pa., has been succeeded by the L. Maxwell Manufacturing Company, which will devote two floors of its large building to making "horseless" vehicles after a kind made by Harry Rants, of the Tivy works.

The South British Trading Company, Limited, 6 Victoria avenue, Bishopsgate street, London. E. C., act as exclusive representatives in the United Kingdom for American manufacturers in general hardware and tools, motor car lamps and tires.

A new kilometre record was made by the Hon. Charles S. Bolls on a 70 horse power Mors racer on the private course of the Duke of Portland, the time being 27 seconds. As the course is down grade the record may not be officially recognized.

The Searchmont Automobile Company have decided to build delivery wagons in addition to the pleasure cars they are now manufacturing. The company has had a Panhard delivery in use for more than a year, and they now have two deliveries in actual service, with which they do all their hauling.

At the annual meeting of the Searchmont Automobile Company on February 26 the following officers were elected for the ensuing year: G. Blum, president; Wade Chance, vice president; Barclay H. Warburton, secretary and treasurer, and W. D. Gash, general manager. Directors: G. Blum, Barclay H. Warburton, Spencer Trask, E. R. L. Gould, E. W. Robinson, Acosta Nichols, W. D. Gash, J. S. Bunting and Wade Chance.

The Chicago Coliseum was emptied of everything connected with the Show on February 22, and many of the machines were shipped to Philadelphia and Buffalo.

The Tennant Auto Tire Company, South Springfield, Ohio, organized with the following officers: President, Irvin Tennant; vice-president, James Homan; treasurer, W. S. Rabbitts; board of directors, Irvin Tennant, H. A. Toulmin, George Sintz, W. S. Rabbitts, Ira Wallace and James Homan.

At the Chicago Show a charging outfit was shown in operation by the National Engine Company, of Rockford, Ill. It consisted of a "Northern" generator coupled to a 5 horse power "National" gasoline motor, with ignition by autosparker. The outfit operated a bank of forty 16 candle power lamps.

The United States Department of Agriculture, Department of Road Inquiries, has just issued its Bulletin No. 23, dealing with road conventions in the Southern States and object lesson roads constructed under the supervision of the office of Public Road Inquiries, and with the co-operation of the Southern Railway.

The E. R. Thomas Motor Company inform us that at the Chicago Show they sold vehicles to the following residents of Chicago: V. W. Kelly, L. B. Doty, D. Miller, Preston Gibson, T. W. Beck, J. W. Davis, C. E. Coey, S. W. Watkins and G. W. Norton. C. A. Coey & Co., of 5311 Cottage Grove avenue, are their Chicago agents.

The Midgley Manufacturing Company, Columbus, Ohio, has elected directors as follows: Thomas Midgley, Thomas K. Wissinger, Otto Engwerson, Dan Krumm, Charles S. M. Krumm, J. O. Johnson, W. D. Hamilton, Charles S. Hamilton and N. M. Petersen. The directors have elected the following officers: Thomas K. Wissinger, president; W. D. Hamilton, vice president; Otto Engwerson, secretary and treasurer, and Thomas Midgley, general manager.

Among recent publications of the Department of Agriculture are the following: "Road Building with Convict Labor in the Southern States," by J. A. Holmes; "List of National, State and Local Road Associations and Kindred Associations in the United States"; "Road Improvement in New York"; "State Aid to Road Building in Minnesota," by A. B. Choate; "Repairs of Macadam Roads"; "Proceedings of the North Carolina Good Roads Convention"; "Wide Tires, Laws of Certain States and Other Matter Relating to the Subject," compiled by Roy Stone; "State Aid to Road Building in New Jersey," by Edward Burrough; "Earth Roads: Their Construction and Repair," by Roy Stone.

LEGISLATIVE AND LEGAL.

Good Roads Legislation in Pennsylvania.

A bill has been introduced in the Pennsylvania Legislature by A. B. Roberts, providing for the improvement and maintenance of the public highways of that State, for the application of the townships for State aid in highway improvement and for the payment of the cost of highway improvement by the State and townships, and making an appropriation for this purpose. The bill also creates an office of engineer of highways and provides for his appointment and for the appointment of assistants. It is to go into effect on April 1 next.

It is not necessary here to go into the technical details connected with the application of this act. But it may be stated that it provides that when the commissioners and supervisors in any township desire State aid for road improvement they must file with the engineer of highways, on or before April 1 of each year, a sworn statement requesting State aid and stating the number of miles of stone roads within their jurisdictions, the condition of same and the amount of road tax levied in their township. The engineer of highways will then ascertain the amount which in his judgment is necessary for the proper maintenance of such roads and to pay to the commissioners their proportion of the appropriation, but the sum paid must in no case exceed the amount of road tax in the township.

Of the appropriation made, $300,000 is to be reserved annually by the engineer for the purpose of maintenance of roads, and shall be apportioned by him to the townships applying for the same, in proportion to the number of miles of improved stone roads contained in the township. No improvement will be made under this act on roads less than 33 feet in width.

The sum of $2,000,000 is to be appropriated to carry out the provisions of this act, but the sum shall not be available to an amount exceeding $1,000,000 per annum, the same to be paid out of any moneys in the treasury of the Commonwealth not otherwise appropriated.

The Indiana State Automobile Law.

Following is the slightly condensed text of the automobile law (Senate Bill No. 25), introduced on January 23 last by Senator Johnston:

Every person driving an automobile on the public highway shall at the request, or signal by putting up the hand, from a person driving or riding horses or other domestic animals, cause the automobile to stop and to remain stationary so long as may be necessary to allow said animals to pass, or until the person in charge succeeds in quieting such animals. This provision shall apply to automobiles going in the same or opposite direction, and when a person operating an automobile is approaching from the rear he shall give an audible alarm sufficiently loud to be heard by the person in charge of such animals, and on the giving of such alarm, the person driving such animals shall turn to one side, giving one-half of the traveled portion of the highway.

Sec. 2. Every owner of an automobile (if a resident of the State of Indiana) shall within thirty days after the passage of this act file in the office of the clerk of the Circuit Court of the county in which he resides, and if a non-resident of the first county he enters when coming into the State, his full name and address, with a brief description of such vehicle, and shall pay to the clerk a registration fee of $1. The clerk shall issue to such person a certificate stating that he has registered in accordance with this section, and shall cause the names of such persons to be entered in alphabetical order in a book to be kept for that purpose. Every person hereafter acquiring an automobile or other motor vehicle shall within ten days after acquiring the same register with the clerk of the Circuit Court as required by this section. This section shall not apply to manufacturers or dealers in automobiles, unless they desire to operate the same upon the public highways, in which case they shall comply with Section 2 of this act.

Sec. 3. Every such automobile shall have the separate initials of the owner's full name placed upon the back thereof in a conspicuous place, the letters to be at least 3 inches in height, so as to be plainly seen 200 feet distant.

Sec. 4. Every person running or operating an automobile in violation of this act shall be deemed guilty of a misdemeanor, and upon conviction shall be fined a sum not less than $25 nor more than $100.

Motor Cab Bill for New York.

An "act for the protection of automobile passengers" has been introduced in the Assembly of the State of New York by Assemblyman Cohn, which provides that no person or corporation shall operate an automobile in the city and county of New York as a common carrier for hire unless the sum of $25 shall previously have been paid to the county clerk, who shall thereupon issue a permit to said person or corporation. This permit shall contain the names of the person or corporation to whom the same has been issued and shall be good for the period of one year from its date of issue.

No passenger shall be obliged to pay more than 25 cents for each mile traveled.

The motorman for any such automobile must have been daily taught and drilled for the period of one month by men experienced in the use of automobiles and who are in the employ of said person or corporation. All men employed as motormen must be residents and householders of the borough of Manhattan, city of New York, where such machines are operated.

No automobile shall be let unless the same has been examined, tested and approved as safe once every month by a duly qualified inspector experienced in the manufacture of automobiles who shall be appointed by the Mayor of the city of New York, and who shall receive as compensation the sum of $1 from the person or corporation owning such automobile so examined.

Contraventions of any of the provisions of this act are a misdemeanor and punishable with a fine of $250, or in lieu thereof with a term of imprisonment in the county jail for not more than thirty days.

Hearing on the Scoville Automobile Bill.

On February 25 a hearing on the automobile legislation pending before the New Jersey Legislature was held before the Committee of Municipalities at Trenton. The essential objections made to the Scoville bill have been avoided in a substitute, the Williams bill, introduced by Assemblyman Edgar Williams.

The Williams bill contains a provision that the speed limit shall not apply to physicians and surgeons. Over forty physicians in New Jersey use automobiles in paying professional calls and most of their work is in the cities. If they are limited to speeds of 8 and 10 miles an hour any emergency cases would have to be neglected.

There should be a provision that Section 8 should not be construed to prevent a person displaying any other number than the Secretary of State's number, provided it be for a lawful purpose, for the reason that under Section 7 the owner of an automobile must comply with the rules of the Essex Park Commission, which require him to carry an additional number to that of the Secretary of State's, and, strictly speaking, such a person, by complying with the rules of the Essex Park Commission, would be liable to arrest. It was pointed out that, while the original bill provided for a penalty of $25, the Scoville bill omits this section and leaves it free to the justice to impose any penalty he may see fit; that the difference between 6 miles an hour and 6¼ or even 7 miles an hour must, in the absence of accurate mechanical speed indicators, be a matter of opinion, for there is no man competent to say at precisely what rate he is going at all times, and if a man is going 6¼ miles an hour for 100 feet when he ought to go 6 miles an hour he is liable to arrest, then surely it is wrong to leave it to the discre-

tion of the justice as to whether this man should be sent to jail for what may be an error of judgment.

In regard to Section 10, first, there is no limitation as to time when a complaint may be made and filed, and it is possible to wait two years, and then charge a man with having run 6¼ miles an hour for 10 feet, when he ought to have run 6 miles an hour for the same 10 feet, and have him arrested for it two years later, when all knowledge of the transaction has passed out of his mind, and when his witnesses are scattered. The complaint should be filed within ten days. Second, the act should be amended so that a summons only could be issued against a resident, and a warrant, if necessary, against a non-resident. Third, a man must always carry at least $50 in his pocket because this is the minimum penalty provided, and as he is liable to be fined $250, he can legally be sent to jail for twenty days unless he has that amount with him at the time.

In a comparison of the Scoville and Williams bills, prepared by W. E. Scarritt, president of the New Jersey Automobile Club, the following points were made:

1. The principle of the Scoville bill is to fix arbitrary rates of speed. The Williams bill accepts these rates of speed.

2. The theory running through the Scoville bill is that the automobilist who exceeds unintentionally and unknowingly these very low limits is a criminal, to be arrested and put in jail. The Williams bill provides that for the first offense, unintentional infraction of the speed limit, the offender is to be summoned before the magistrate and to be given a hearing.

3. The Scoville bill permits the automobilist to be arrested at any time after offense and complaint made by anyone and allows the arrest of the automobilist in any part of the State at any time upon such complaint. The Williams bill differs from this in this respect, that it does not permit a man to be arrested for the first offense, that it limits his fine to $25 for infraction of speed limits under ordinary circumstances.

4. The Scoville bill contains no limitation upon the punishment, whether by fine or imprisonment, upon the man who infringes the speed limit. It makes it a crime for the man to exceed the speed limit, whether knowingly, unintentionally or otherwise. It makes a criminal of the man who runs at the rate of 6¼ miles an hour for 10 feet where the limit is 6 miles an hour, and yet it does not limit the punishment to be meted out to this statute created criminal. There is a startling absence in the provision of the bill. It makes the infraction of the speed limit a crime, but does not limit or define the punishment of the crime, which remains in the discretion of the justice whether to fine, imprison or otherwise punish, as he pleases.

It was also argued that automobilists, with the exception of a few reckless and thoughtless scorchers, are ready to cooperate in the enforcement of the statutes; that they should not be made to suffer for the misdeeds of a few; that a great industry with $30,000,000 invested in it in this country should not be injured, and that users of motor vehicles should be treated as law abiding citizens and not as criminals. There was no dispute over the speed limits of a mile in ten minutes at crossings and curves, a mile in seven minutes in built up sections, and a mile in three minutes in the open country. The main contention was over the manner of arrest and the character of the punishment prescribed by the original Scoville bill.

It is understood that an agreement was reached at the hearing that another bill will be reported this week. It is said that the probable changes will be that the fine for a first offense will be $50, that the machine may be confiscated for ten days or more for a second, that the owner may be imprisoned not to exceed thirty days for the third, and that in the first case the owner will be permitted to furnish a bond, if he has not the cash with him for the payment of his fine. The provision as to registration, license and carrying the license number on the vehicle, it is thought, will stand, but the speed will be measured on the basis of time per mile, instead of miles per hour.

In the second trial of Paul Verget, chauffeur of Cord Meyer, the defendant was found guilty of violating the automobile speed law and was fined $50, which Mr. Meyer paid under protest.

The application of the Spaulding Automobile and Motor Company, Buffalo, N. Y., for voluntary dissolution was granted by Justice Kenefick on February 24, and Nelson P. Baker, the temporary receiver, was directed to sell the effects on February 28.

The suit brought by Greene, Tweed & Co., of New York, against the Sterling Lubricator Company, of Rochester, N. Y., on the Buckley patent No. 590,297, dated September 21, 1897, for force feed lubricators, was decided by Judge Coxe in the United States Circuit Court on February 24 in favor of the plaintiffs. The court granted a perpetual injunction against the Sterling Lubricator Company, with an account of profits and assessment of damages.

New Incorporations.

The Gillies Launch and Engine Company, Ottawa, Que., has been incorporated with a capital of $100,000 to manufacture automobiles, etc. The provisional directors are T. E. Sullivan, J. D. McCann, A. J. H. Russell, Peter McVeigh and J. E. Askwith.

The Mercedes Company, of New York, has been incorporated with a capital of $2,700,000 to manufacture automobiles and other self propelling vehicles. The directors are Edward Bernhard, Philip Ahrens, C. B. Wynkoop and James T. Arnold, of New York city; Philip Huetwohl, of Brooklyn; H. Smith, of Plainfield, N. J., and Theophilus Parsons, of Hempstead, N. Y.

The Wood Vapor Vehicle Company, of Brooklyn, New York, has been incorporated with a capital of $50,000 to manufacture steam automobiles, etc. Directors, J. C. Wood, C. T. Sauer and E. L. Wood.

The Remington Automobile and Motor Company, Utica, N. Y., has been incorporated with a capital stock of $100,000. The incorporators are Philo E. Remington, of Ilion, and O. S. Foster and W. H. Owen, of Utica, and the following are the directors for the first year: J. B. Wild, O. S. Foster, W. H. Owen, L. M. Graham, A. E. Omens, Charles Xardell and A. J. Baechle. John B. Wild will be president and W. H. Owen business manager.

The New England Automobile Association Show.

The show promoted by the New England Automobile Association opened at the Mechanics Building, Boston, on the evening of February 24. The show was organized in the first place in opposition to the show to be held by the Boston dealers at Symphony Hall this month, but at the last moment a conciliation took place between the two opposing organizations and the New England Automobile Association Show was converted into a demonstration of automobile driving and of tricks performed with automobiles. The event took place at the Mechanics Building at the same time that a dog show was held in the opposite wing, but this did not at all interfere with the success of the demonstrations.

Most of the vehicles shown were privately owned by members of the Massachusetts Automobile Club. The show was opened with a concert and the attendance the first night is estimated to have been around 2,000 persons. The program included obstacle races, with both large and small machines, a slow race and performances on a teetor board. As it is not unusual at such indoor performances, a number of smashups occurred, though nothing that could be called serious. Between the automobile numbers on the program trick bicycle riding and acrobatic performances were introduced.

Following is a list of automobiles, etc., exhibited at the show:

Knox, Duryea, White, Georges-Richard, Buffum, Waverley, Stevens-Duryea, A. Clement, Paris; Decauville, Automotors, U. S. Long Distance, Renault, Crest, Rambler, Country Club Car Company, American, Winton, Pope-Robinson, Shattuck & Son, Oldsmobile, Packard, Auto Car, Mobile Company, Stanley, Marsh Motor Cycle, Columbia Electric, Locomobile, De Dion-Bouton, Searchmont, Victor, Darracq, Panhard, Moyea, and A. Shuman & Co., auto clothing.

rubber tire for high speed vehicles. The different contestants naturally took different views of this decision of the judges. The manufacturers of the tire least affected by punctures protested that the rules contained nothing about a resiliency test, but abided, of course, by the decision of the judges. Now, the manufacturers of the winning tire have come forward with a statement that, in their opinion, genuine road punctures should not be counted against a tire in a "durability" test, as these, with the full pneumatic tire, are distributed as the fortunes of war, and do not interfere with the durability of the tire. They consider that the points covered by the subsequent test, viz., absorption of vibration and traction efficiency, are based on scientific conclusions, and that the superiority of pneumatic tires must be proved by such conclusions.

In view of the fact that a tire contest may possibly be held in this country the coming season, it is worth while to go into this matter a little further. There are evidently three important qualities which a pneumatic tire should possess in the greatest possible degree. First, it should be very resilient, to relieve the machinery of all road shocks; second, it should be as nearly as possible proof against punctures, and, third, it should be durable—that is, not wear too rapidly. It is pretty generally understood that the most resilient tire is one with thin walls compared to its diameter, but such a tire would, from the nature of things, not be very immune from punctures, and perhaps also not as durable as a tire with heavy tread. The latter point is, of course, debatable, while as to the former there can be no question. The best tire is evidently one which combines these three qualities (durability, resiliency and immunity from punctures) in the highest degree. It would be difficult to determine durability in a contest, as this would require running the tires until entirely worn out, which might, under some conditions, take very long, as cases have been reported in our columns where a tire has withstood constant use for several years. A contest would necessarily have to be limited to a certain distance, and the only criterion of durability that could be obtained would be the number of renewals required during the test. The time lost in mending punctures ought to be considered in the awards, for, although punctures are largely dependent upon chance, it will be granted that the construction of the tire is also an important factor in the frequency of punctures, and loss of time on the road due to punctures is a decidedly serious matter to most automobilists.

Before a tire contest is held, therefore, it will be advisable to work out a formula for properly co-ordinating durability, resiliency and immunity from punctures, as a tire which is deficient in any one of these respects is of little value, however excellent it may be in respect to other qualities.

Explosive Engine Formulæ.

Some readers of the article by Mr. Stoddard in another column of this issue may reach the conclusion that his formula for flywheel weight is impractical, as it gives in the example cited results which are greatly at variance with common practice in automobile engine design. In this connection it should be explained that the flywheel weight depends directly upon the fluctuations in speed allowable, and that the weight shown to be necessary in the example is so much greater than is actually provided in automobile engines of this size is simply an indication that in automobile engines much greater fluctuations of speed than 3 per cent. are allowed. The example is simply given to show that the simplified formula gives practically the same results as the more complicated ones heretofore employed.

In considering the problem of the flywheel weight required for automobile engines it is often overlooked that the vehicle itself acts as a store of kinetic energy, which tends to even out the pulsations in its motion. If we take as an example the light runabout type of gasoline vehicle, we find that when going at 20 miles an hour the car has stored up about three times the amount of energy stored by the engine flywheel. The result is that as soon as the speed of the engine is slightly reduced the torque required is considerably lessened, as some of the kinetic energy stored in the car is now expended in driving. The fluctuations in speed are therefore much smaller than one might conclude from a calculation on the basis of constant torque on the engine. The flywheel of the engine must, however, be large enough to prevent undue fluctuations in speed when running on the low gear, with the engine pulled down to its lowest speed of stable running. Under these conditions the kinetic energy stored in the car is almost negligible. Consequently, while the inertia of the vehicle itself can have little effect on the minimum flywheel weight that must be provided, it greatly adds to the smoothness of running at high speeds.

The Demand for Practical Driving Instruction.

Prospective owners of automobiles are beginning to appreciate that the operation and care of an automobile require knowledge and skill which cannot be acquired in a conversation of a few minutes or on a single trip with a demonstrator. Of course, many purchasers in out of the way places begin to drive their vehicles without previous instruction, but we believe a considerable number of the unsatisfactory experiences with automobiles have been due solely to this want of proper instruction. This, of course, does not apply where the purchaser is a mechanically trained person, who can easily become acquainted with the mechanical construction and the principle of operation without tuition. In England and France schools have been established for instructing in the art of driving, and some of these are evidently quite successful. It will probably not be long before we have similar institutions in this country. The demand for them is well shown by the results of a recent advertisement in a New York daily asking for names of persons wishing such instruction, to which no less than 283 replies were received.

High Compression Motors.

As reported in another column, some tests have recently been made with a small air cooled De Dion motor, rebuilt to work on the Banki system. Various attempts have been made to adapt motors working on the Diesel and Banki principles to automobile use, but without signal success so far. Whatever the advantages of these motors may be for stationary work, for automobiles they are open to a number of objections. The high compression makes starting difficult, requires a large flywheel and extreme care in keeping cylinders and valves from leaking; and these motors are not adapted to run at variable speeds, as the ordinary gasoline motor of low or medium compression. While the motor subjected to the tests above referred to showed a certain increase in power when worked on the Banki system, it may be presumed that to insure equally steady running at the higher compression enough flywheel weight would have to be added to counterbalance the gain in specific power noted. And the greater fuel economy, which is the most important advantage of these motors built

for stationary purposes, counts for little in an automobile in comparison with the loss of flexibility.

Lamps.

Considerable comment has been heard recently on the gradual increase in the candle power of searchlights carried on automobiles. Although fairly powerful lamps are a requisite to safe travel at night, consideration for other road users would seem to point to a limit of power which should not be exceeded. The glare of a searchlight of hundreds of candle power is certainly annoying to persons meeting a vehicle carrying such a light, and has a tendency to scare horses. The practice of carrying excessively powerful lamps is a parallel to the use of unduly powerful horns. No definite limits can well be prescribed, and legislative regulation of these points would be objectionable. Automobilists should use their own judgment in these matters, remembering that if undue liberties are taken in these respects the public may retaliate through oppressive legislation.

Much of the objection to powerful lamps could be overcome by using suitable shields, which reflect the light onto the road instead of throwing it up in the air. Horses would then not notice the glare of the lights until within a very short distance of the vehicle, and the vehicle would have passed them before they had time to cut any capers. The illumination, as far as the automobilist is concerned, would be just as efficient, because all that he needs to see is the road.

The Water Circulation.

By Reynold Janney.

From 35 to 50 per cent. of the explosive energy in an internal combustion engine passes into the walls of the cylinder, and must be removed by a circulating fluid or liquid. With corrugations, flanges or pins sufficient radiating surface may be exposed to air circulation to keep the temperature of the cylinder within working limits. Air cooling is practicable, however, only where the volume of the cylinder is small, exposing a proportionately large outside area. As volume increases as the cube of the dimensions, while area increases as the square, engines of any considerable size require a more effective cooler than air. Water is almost universally employed, and the cooling system consists of a jacket surrounding the cylinder, a tank serving as a water reservoir; a radiator, with large surface, which disperses the heat from the water; pipes for circulation, and a pump for maintaining the circulation.

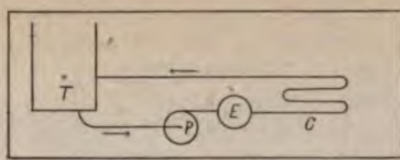


Fig. 1.

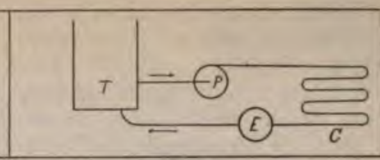


Fig. 2.

The particular feature to be discussed in this paper is the direction of the circulation. In The Horseless Age of February 4, 1903, Mr. Travis called attention to the importance of proper drainage and venting. The prevailing negligence of designers in this matter would seem inexcusable, and many an operator has suffered no small annoyance and expense for want of proper provision for draining the water system in cold weather.

There are three systems of circulation in common use. In Fig. 1 the water is taken by the pump P, directly from the tank T, forced through the engine E, on through the radiator C, and back to the tank.

In Fig. 2 the circulation is from the tank out through the pump to the radiator, and thence through the engine directly to the tank.

In Fig. 3 the tank is provided with air tubes, dispensing with any special radiator, and the circulation is through the pump to the engine and thence to the tank.

Each one of these systems has its own peculiarities, some of which are positively disadvantageous features that apparently have been overlooked by the designers. The subject admits of mathematical discussion, but in order that equations may be avoided definite quantities and relations will be assumed. Let the tank hold 10 gallons and the radiator have capacity sufficient to keep the temperature of the water under normal working at a given degree, say 60°, above the atmospheric temperature. Let 1 gallon of water pass through the engine in unit time, and ten units of heat be given to the gallon as it passes. Let us discuss the circulation under these conditions for the different cooling systems represented by the three figures.

Assuming that the water in the tank in Fig. 1 is 60° warmer than the air, the first gallon passing through the engine will absorb ten units of heat and take it to the radiator, where the whole ten units will be radiated, and the water return to the tank with no additional heat beyond that which it started. Each successive gallon going through the engine will repeat the process, and the temperature of the tank will remain constant. There need be no loss of water except that due to leakage and the slight evaporation taking place at the moderate temperature of the tank. The only important requirement is that the radiator's capacity shall be equal to the work required of it.

The results will be quite different, however, with the arrangement shown in Fig. 2. Let the conditions be identical with those assumed in discussing Fig. 1, so far as temperatures and volumes are concerned. The first gallon of water leaves the tank passing through the radiator on its way to the engine. It will lose a part of the 60° extra heat which is carried from the tank, but this may be ignored, as another phase of the problem leads to results so much more important as to render the consideration of this unnecessary. The first gallon receives from the engine 10 units of heat and carries them to the tank, where they are distributed among the whole 10 gallons, each gallon receiving 1 unit. The second gallon leaving the tank takes 1 unit of heat to the radiator, leaving 9 units in the tank. The unit taken to the radiator is disposed of and 10 more units taken from the engine are conveyed to the tank, making a total of 19 units in the tank. The third outgoing gallon carries one-tenth of this, leaving 17.1 units in the tank, and brings into the tank 10 more units, making 27.1 units. The fourth gallon carries one-tenth of this out, leaving 24.4 units. This process continues indefinitely, adding 10 and subtracting one-tenth of the sum, thus always increasing the temperature of the water in the tank. The boiling point is soon reached, when evaporation prevents a further increase of temperature; or, if the tank be closed, a dangerous pressure is soon generated.

If the pump should be located between the engine and the tank the generation of steam in the engine jacket might stop the circulation of water. Altogether the arrangement of Fig. 2 seems undesirable. Indeed it is only tolerable when the circulation is so rapid that all the water of the tank is forced throught the radiator within the unit of time.

The plan represented in Fig. 3 economizes in space, inasmuch as it combines into one both the tank and the radiator, and it furthermore exposes the whole volume of water to radiation all the time; but it necessitates the use of a forced draught.

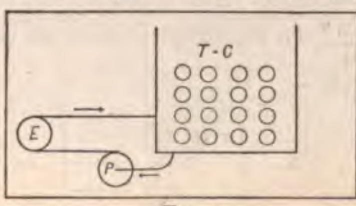


Fig. 3.

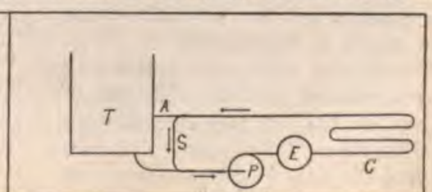


Fig. 4.

The long, narrow, tubular air spaces do not admit of a free circulation of air, and a fan operated by the engine is employed. This is advisable in any case, as better radiating facilities are thereby secured when the engine runs while the carriage remains standing.

In Fig. 4 a variation from Fig. 1 is shown, in which a shunt pipe S allows the water to return through the pump without entering the tank. In this case the tank serves purely as a reservoir, and need not be counted as a part of the circulating system. Being always in communication with the circulating system, however, any loss by leakage or otherwise is immediately replaced from the tank supply. It is possible to dispense with the part of the return pipe A, which enters the tank, and use but one pipe connection between the circulation and the tank.

The Abbreviation of Some Explosion Engine Formulas.

By E. J. Stoddard.

For practical purposes the formula

$$W = 110\,A\,V\left[\left(\frac{V}{V_1}\right)^{1/3} - 1\right] \ldots\ldots(1)$$

for the work in a gas engine cylinder has received the approval of many competent judges. It may, I think, be conveniently abbreviated as follows:

Let the ratio of volumes $\frac{V}{V_1} = R$, and the stroke $= S$. Then

$$\left(\frac{V}{V_1}\right)^{1/3} = R^{1/3},$$

and

$$V = \frac{\frac{V}{V_1}\left(V - V_1\right)}{\frac{V}{V_1} - 1} = \frac{R\,S}{R - 1}.$$

Substituting in (1) we have

$$W = 110\,A\,\frac{R\,S}{R-1}\left[R^{1/3} - 1\right]$$

$$= 110\,A\,S\,\frac{R}{R-1}\left[R^{1/3} - 1\right] \ldots\ldots(2)$$

or if we take S in inches

$$W = 9.167\,A\,S\,\frac{R}{R-1}\left[R^{1/3} - 1\right] \ldots(3)$$

If we assume that 3 is the average ratio of volumes and substitute this value of R in (3) we shall have

$$\left\{\begin{array}{l} W = 6.0777\,A\,S, \text{ or} \\ H.P. = \dfrac{A\,S\,N}{10{,}860} \end{array}\right. \ldots\ldots(4)$$

The numerical coefficient might evidently be taken as 6.08 without material error. Thus for each ratio of volumes there will be a numerical coefficient by which if the piston area and stroke in inches be multiplied the product will be the work of the explosion stroke in foot-pounds.

If we have some other ratio of volumes and are not satisfied with the approximate result given by (4), we may calculate the numerical coefficient for the particular case. We may find the ratio of volumes by actual measurement, or, assuming the cylinder to be tight, we may calculate it from the ratio of pressures. Thus we know that within the error of measurement

$$\left(\frac{V}{V_1}\right)^{1/3} = \left(\frac{P_1}{P}\right)^{1/4} \therefore \frac{V}{V_1} = \left(\frac{P_1}{P}\right)^{3/4}$$

$$= \sqrt{\frac{P_1}{P}}\sqrt{\sqrt{\frac{P_1}{P}}}$$

The roots may be taken from an ordinary table in estimating the numerical value of the second member of this equation. So we may say generally

$$W = C\,A\,S, \text{ or } I.H.P. = \frac{C\,A\,S\,N}{66{,}000}, \ldots(5)$$

where C is a constant for each ratio of volumes or compressions; A, the piston area in square inches; S, the length of the stroke in inches, and N, the number of revolutions per minute.

The following table gives the values of C for the values of R, to which they are set opposite:

R	C
2	4.749
2.5	5.454
3	6.0777
3.5	6.663
4	7.176
4.5	7.672
5	8.124

If desirable, for greater accuracy, one might plot a curve with these values of R as abscissas and C as ordinates—thus he would be able to interpolate a value of C for any intermediate value of R.

THE WEIGHT OF THE FLYWHEEL.

It is desirable to have a formula for the weight of the flywheel rim in pounds by which by direct substitution, without being obliged, for instance, to calculate the horse power of the engine as an independent operation, we may calculate the weight of the flywheel, and in such a formula it is desirable to use as few figures as practicable.

Let D be the medium diameter of the flywheel rim in feet, a the number of idle strokes between explosions (including the first or working stroke), for which the wheel is to be designed; N the number of revolutions per minute; n the coefficient of variation of speed allowable, and W the weight of the flywheel in pounds.

The speed of rotation of the wheel will vary between $\left(1+\frac{n}{2}\right)N$ and $\left(1-\frac{n}{2}\right)N$ revolutions per minute. The velocity of the rim in feet per second will be

$$\frac{\pi D\left(1+\frac{n}{2}\right)N}{60} \text{ and } \frac{\pi D\left(1-\frac{n}{2}\right)N}{60}$$

Substituting these values in the equation $\frac{W V^2}{64}$, for the stored work or *vis viva*, we obtain

$$\frac{W\left(\dfrac{\pi D\left(1+\frac{n}{2}\right)N}{60}\right)^2}{64}$$

and

$$\frac{W\left(\dfrac{\pi D\left(1-\frac{n}{2}\right)N}{60}\right)^2}{64} = \frac{W\left[D\left(1+\frac{n}{2}\right)N\right]^2}{23{,}340}$$

and

$$\frac{W\left[D\left(1-\frac{n}{2}\right)N\right]^2}{23{,}340}.$$

Squaring the expressions in the parentheses and subtracting the latter from the former we find the expression

$$\frac{W\,D^2\,n\,N^2}{11{,}670} \ldots\ldots\ldots\ldots (6)$$

for the energy given out by the flywheel in falling from its maximum to its minimum speed of rotation.

If we assume that the average resistance to the motion of the engine is one-fourth of the power given out on the working stroke, we shall have from equation (5)

$$\frac{C\,A\,S\,a}{4} \ldots\ldots\ldots\ldots\ldots(7)$$

for the resistance overcome by the flywheel during its variation of speed. We can then write (6) and (7) in the form of an equation

$$\frac{W\,D^2\,n\,N^2}{11{,}670} = \frac{C\,A\,S\,a}{4}$$

and by transposing and reducing we get for the weight of the rim in pounds

$$W = \frac{2{,}920\,C\,A\,S\,a}{D^2\,n\,N^2} \text{ nearly} \ldots\ldots(8)$$

Mr. Roberts' equation seems to assume $a = 4$ and Prof. Grover assumes $a = 7$—.

If we have a two cylinder engine with the impulses equally spaced a would have half the value that it would have in a single engine of the same size, and therefore to obtain the same variation in speed the flywheel might be half as heavy. If we have a twin cylinder engine with the explosions following each other immediately, we should take the same value of a, but we should now take 2 C A S for the work, because the two successive strokes accumulate their power, and a flywheel of double the weight of that for a single cylinder would be required.

If we substitute for C in (8) the value for $R = 3 = \frac{V}{V_1}$ we have in round numbers

$$W = \frac{18{,}000\,A\,S\,a}{D^2\,n\,N^2} \ldots\ldots\ldots (9)$$

which may be used for rough calculations, the value of R not being known.

Thus if we have a single cylinder engine of 4 inches diameter = 1,257 square inches in area of piston and 6 inches stroke, making 600 revolutions per minute, the flywheel being 15 inches = 1.25 feet in diameter, and we wish a variation of .03 in four strokes, we would have from equation (9)

$$W = \frac{18{,}000\,(12.57)\,(6)\,(4)}{(1.25)^2\,(.03)\,(600)^2} = 322 \text{ pounds.}$$

Using the same letters the formula given by Mr. Roberts is

$$W = \frac{I.H.P. \times 111{,}600{,}000{,}000}{D^2\,N^3\,n},$$

in which D is taken in inches, and I. H. P. is the indicated horse power. Calculating the latter from (4), we have

$$\text{I. H. P.} = \frac{\text{A S N}}{10{,}860} = \frac{(12\ 57)\ (6)\ (600)}{10{,}860}$$
$$= 4.17 \text{ I. H. P.}$$

which substituted in Mr. Roberts' equation gives

$$W = \frac{(4.17)\ 111{,}600{,}000{,}000}{(15)^2\ (600)^3\ \ 03} = 319 \text{ pounds.}$$

Frederick Grover's formula is: W (tons of 2240 pounds)

$$= \frac{\text{H P } a \ 343{,}900}{R_1{}^3 \times D^2\ (1 - C^2)\ (1 + C)},$$

in which D is taken in feet, R_1 is the maximum speed in revolutions per minute, and $C = 1 - n$. Substituting we have

$$\frac{4.17 \times 4 \times 343{,}900}{(609)^3\ (1.25)^2\ (1 - [97]^2)(1 + 97)}$$
$$= .1399 \text{ ton} = 314 \text{ pounds.}$$

The Belgian Show.

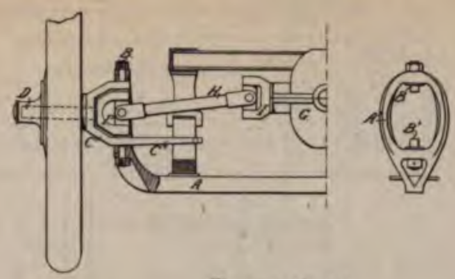
By A. D. S. Pontes.

The automobile industry has made great progress in Belgium during the last year, and the low prices asked for vehicles by the manufacturers and the generally careful workmanship make the Belgium automobile industry the most formidable competitor of the French industry.

The general features of the vehicles on show at the recent Brussels Exhibition may be summarized as follows: Armored wood frames with section varying in proportion to the stress; very long, semi-elliptic springs and frequently platform springs in the rear; wood wheels of equal diameter; two brakes, one an emergency brake on the rear wheels, operated by a lever, and the other operating on the differential and actuated by means of a pedal; conical clutches and clash gears, usually of three forward speeds and one reverse and often driving direct on the high gear through a Cardan shaft transmission; motors of one, two or four cylinders, with aluminum crank case, jump spark ignition, throttle governor which may be put out of action by means of an accelerator pedal, and automatic or mechanically operated inlet valves. The water circulation is usually effected by means of a positively driven pump, the water being forced through single flanged cooling tubes, and rubber connections being used for the water pipes. On the whole, chain driving is more common than shaft and bevel gear driving. The bodies are very luxurious and comfortable and are independent of the frame; the tonneau still remains the most popular style. The horizontal motor and belt transmission were entirely absent from the Show, and neither were there any high powered vehicles with a special form of body to reduce the air resistance, with the exception of the Serpollet racer.

The Ateliers Janssens exhibited a vehicle in which the front wheels are both steering and driving. A front view of one-half of this device is shown in Fig. 1 and a side view in Fig. 2.

The front axle A has its two ends forged



Figs. 1 and 2.

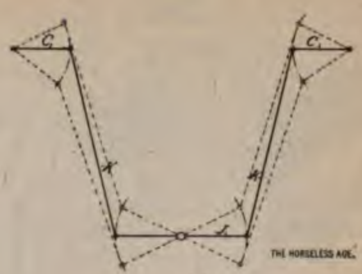


Fig. 3.

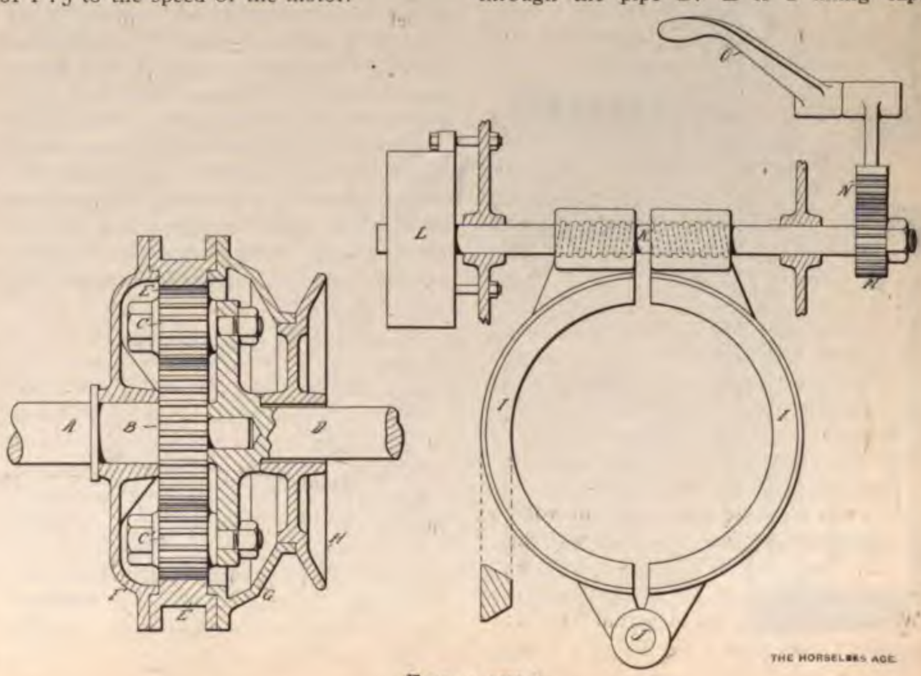
in the form of a ring A (Fig. 2), in which are secured two studs B B'. These studs serve as pivots for the fork C placed around the spindle D driving the wheels. Motion is transmitted from the case G to the spindle D by means of the shaft H provided with the universal joints I I'; C' is a projection of the fork C serving as steering lever. As shown in Fig. 3, the steering column is fastened in the centre of a lever J, connected with the arms C by rods K. With the Janssens system any kind of propelling means may be used, and, besides, for heavy vehicles the four wheels may be driven. The back part of the frame being free, any kind of body may be applied.

The Hautier "clutch" (Fig. 4), which is essentially a planetary gear, transmits the power from the motor to the change gears and at the same time reduces the speed. On the motor shaft A is keyed a gear B in mesh with the pinions C C' loosely mounted on studs fastened to projecting arms on the shaft D. The pinions are also in mesh with the internally toothed periphery E. The pieces E, F, G, H are bolted together to form a case for the gears, the parts F and H being loosely carried on the shafts A and D respectively. G forms with H a V shaped groove in which a brake may be applied. When the gear E is locked in position the pinions C C' are caused to roll on the internal gear E and thereby produce a reduced motion of the shaft D, in the ratio of 1 : 5 to the speed of the motor.

Fig. 5 shows the blocking or brake system; two V shaped blocks I pivoted at J have their upper parts traversed by a rod K which is threaded right and left handily. At one end of the rod K is fastened a strong spiral spring contained in an adjustable box L, while upon the other end of the rod a pinion M is keyed in mesh with a toothed sector N. The spiral spring maintains the blocks applied and the motor is then in gear with the transmission. When the driver depresses the pedal O the rod K turns, spreads the blocks and thus unclutches the engine. The advantages claimed for this device are that with it the speed changing gears may be of small diameters and the two bevel gears of the differential of equal size.

The Hautier motor has four cylinders, of 4 inches bore and 4.6 inches stroke, and develops 24 horse power at 1,000 revolutions per minute. The valves are placed on opposite sides of the cylinders and are all mechanically operated. The engine is provided with magneto and jump spark ignition. The flywheel is located in front and serves as a fan for cooling. The speed changing gears are provided with individual clutches.

In the H. P. Dechamps cooler, shown in Fig. 6, an inner vessel A is connected to an outer vessel B by means of a large number of small tubes C. Water forced by the pump enters at A, passes in the small radiating tubes C and returns to the cylinders through the pipe D. E is a filling cap.



Figs. 4 and 5.

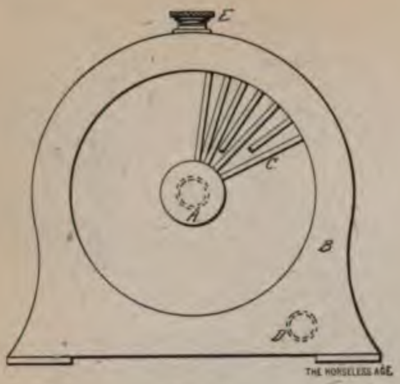


FIG. 6.

The cooler is placed in front, and no tank and fan are used.

Longtin & Le Hardy de Beaulieu have placed on the market a new clutch which is said to be of progressive action (gradually gripping), and to unclutch instantaneously. As shown in Fig. 7, on the flywheel are mounted a number of studs D carrying the flat rings B. Between these rings and around the studs are placed springs C which tend to keep the rings out of contact with each other, but the movement of the latter is limited by abutments of the piece A carried on the flywheel. The same arrangement of rings is mounted on the second member K of the clutch. The rings are pressed together by the disk L, pushed by a strong spring O. When the disk L is moved back, the contact rings are forced out of contact

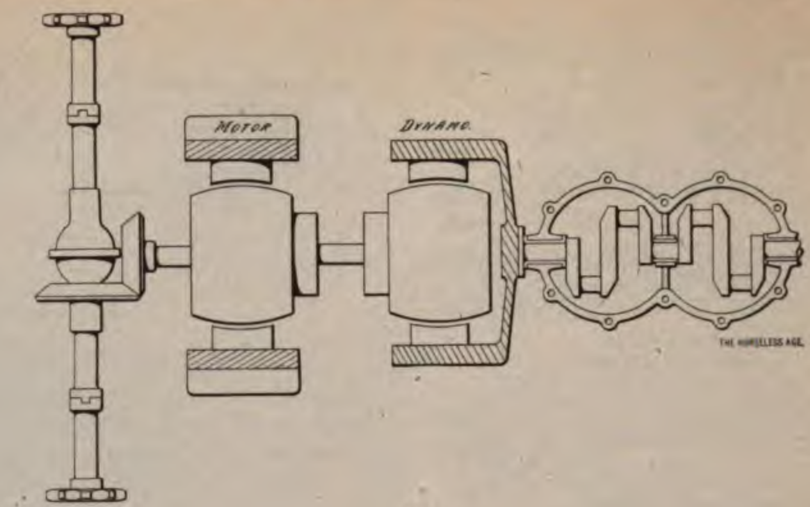
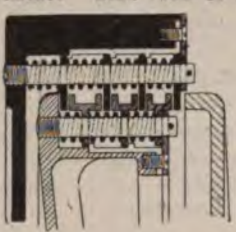
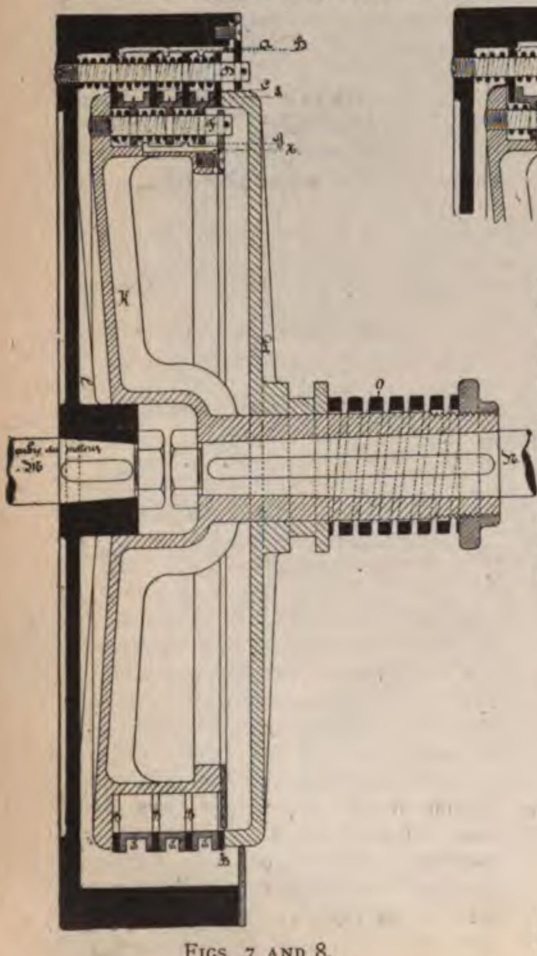


FIG. 9.

and the two members are free (Fig. 8). The motors manufactured by this company are equipped with a pump of unusually large size, driven directly by the motor shaft. The Ateliers Germain have built a motor of 30 horse power with four independent cylinders of 5.6 inches bore and 6.4 inches stroke. The water jacket is made of a sheet of copper. The valves are placed side by side and are mechanically operated. The carburetor is fitted with a device which automatically increases the quantity of air admitted in the cylinders when the engine is running at high speed (see THE HORSELESS AGE of February 18).




FIGS. 7 AND 8.

These same manufacturers also exhibited a vehicle on the combination gasoline and electric system (Fig. 9). The flywheel of the gasoline motor forms the field magnet of a dynamo having its armature keyed on a shaft upon which is also keyed the armature of a motor, the field of the latter being secured to the frame of the vehicle. In starting the gasoline engine the current produced by the dynamo is sent into the motor, the excitation of which is then at its maximum. By means of a controller the exciting current of the motor is gradually reduced (through resistances), and the more the excitation is diminished the more the speed of the motor increases. For the highest speed the motor is cut out of circuit and the dynamo armature is short circuited through itself, thus forming practically a magnetic clutch, although some slipping is necessary to produce the magnetizing current, about 1 per cent. of the engine speed, it is claimed. This device may be regarded as a clutch which slips more or less to reduce or increase the speed. In such a carriage the shocks from the wheels are not transmitted to the engine, and, moreover, a great range of speeds is obtained. When running on a descent, the speed of the armatures may exceed the speed of the gasoline engine, and in that case the current through the motor ceases and no exciting current is generated any longer. Hence the engine is automatically unclutched when the speed of the vehicle exceeds the speed which would be given it by the gasoline motor. Electric braking is obtained by reversing the current of the motor, which is then acting as a dynamo. The reverse is obtained by the displacement of the shaft of the differential, which carries gears of special construction.

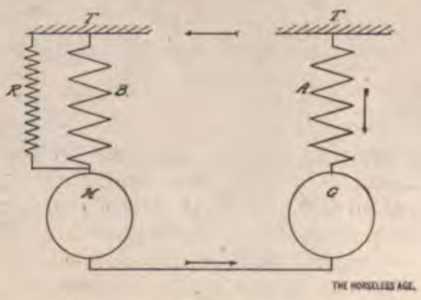


FIG. 10—ELECTRIC CONNECTIONS OF COMBINATION SYSTEM.

In the motor exhibited by the Ateliers Vivinus the intake valves (Fig. 11) are instantaneously transformable from mechan-

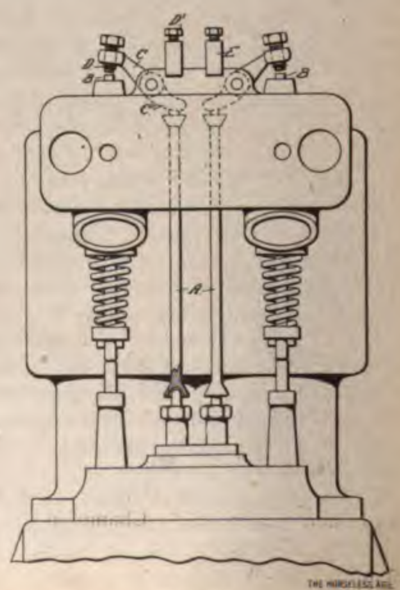


FIG. 11.

ically operated valves into automatic valves and vice versa. The cam acts on a rod A, which transmits its motion to the valve stem B by means of a lever C pivoted at its centre on the head of the cylinders. D is an adjusting screw for a spring placed between the end C of the lever and the stop piece E. The ends of the rods are made hollow, as shown in the section. By simply withdrawing the rods A the valves act automatically.

N. A. A. M. Matters.

The association is sending out the following circular: "During the week of the Chicago Show Willard A. Smith, chief of the Department of Transportation Exhibits, World's Fair, St. Louis, met a number of the principal automobile manufacturers and outlined the plan for exhibiting automobiles at St. Louis next year.

"In our Bulletin No. 6, under date of October 15, we laid this matter before you and stated that there would be no charge for space. It seems quite necessary that American manufacturers make a good showing at this Exposition, for patriotic if for no other reasons.

"The time has now arrived when individual applications for space must be received, within two or three weeks at the latest. The next meeting of our executive committee will be held March 18, and before that time we should like to know the amount of space, if any, you would require at St. Louis. It is our intention to take this matter up with a view to handling the exhibits of the various manufacturers collectively, at a very nominal cost."

The association hereafter will have larger quarters, having taken a lease of the large office adjoining that of Secretary Unwin. It will be used mainly as a meeting room.

Trade Literature Received.

"Vans, Platform Trucks and Omnibuses."—American Steam Wagon Company, 61 Broadway, New York city.

"Goodrich Clincher Tires for Automobiles and Other Vehicles."—The B. F. Goodrich Company, Akron Rubber Works, Akron, Ohio.

"The Searchmont."—Searchmont Automobile Company, Philadelphia, Pa.

"Automobiles, Boat Motors and Cycle Motors."—F. Hiorth, of Christiania, Norway.

"Moteurs à deux temps 'Cormery.'"—F. Hiorth, agent, at Christiania, Norway.

"Asbestos Automobile Houses."—Jones-Corbin Company, Philadelphia.

"Grout Steam Motor Cars."—Grout Brothers, of Orange, Mass.

"Champion Transmissions for Automobiles and Launches."—Champion Manufacturing Company, 479 Hancock street, Brooklyn, N. Y.

Business Automobiles. Price, 10 cents.

BEGINNERS PAGE.

The Electric Motor.

Before it is attempted to explain the principle of operation of the electric motor, it will be well to state a few of the simpler laws of magnetism and electromagnetism. Magnetism is most familiar to the public as the property of hardened steel which has been treated in a certain manner, to attract iron particles. Bars or horseshoe shaped pieces of hardened steel which have been subjected to the "magnetizing" process are known as permanent magnets. If pieces of soft iron are subjected to a magnetizing influence they also acquire magnetic properties, but they lose these again the moment the magnetizing power is withdrawn. Magnets of soft iron are therefore called temporary magnets.

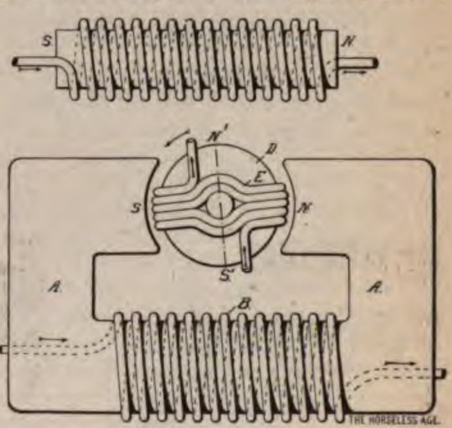
A freely suspended magnet always has a tendency to assume a certain direction, one of its ends tending to point toward the north and the other toward the south. The end pointing toward the north is called the north pole or positive pole of the magnet, and the end pointing toward the south the south or negative pole. When two magnets are brought into proximity the like poles repel and the unlike poles attract each other.

The space around a magnet in which its magnetic force is active is called a magnetic field. A magnetic field is supposed to be permeated with lines of magnetic force, which radiate from the north pole of the magnet and return through the surrounding space (the magnetic field) to the south pole. The direction of the magnetic force at any point in this field may be determined by means of a magnetic needle or compass.

An electric current always produces a magnetic field around the wire through which it flows, as may be seen by bringing a small compass needle into the vicinity of a wire carrying a current. But to produce a strong magnetic field the wire must be wound into a coil of many turns. The strength of the field inside such a coil is proportional to the number of turns in the coil and to the current flowing through it. If an iron or steel bar is introduced into such a coil while the current is flowing through it, the bar becomes at once strongly magnetic. If the bar be of hardened steel it will retain nearly all of the magnetism after it has been withdrawn from the coil or after the current has ceased to flow through the coil, but if it be of soft iron it will lose practically all of the magnetism as soon as it is withdrawn from the coil or the current ceases to flow. When a piece of iron is brought near the ends of a coil through which a current is flowing it is drawn into the coil by the magnetism set up by the current. A helical coil of wire through which a current is flowing has all the magnetic properties of a steel magnet, but the magnetic force is multiplied many times by the introduction of an iron core into the coil.

The direction of current flow through the coil and the direction of the magnetic force within the coil are definitely related, and the relation is best remembered by the following rule (Fig. 1): Suppose the coil to be a corkscrew; then, if the current flows through it right handedly, the north pole points in the direction in which the corkscrew would advance if turned right handedly.

The magnetic lines above spoken of form closed circuits passing through the magnet from the south to the north pole and returning through the space surrounding the magnet from the north to the south pole. Air offers a far greater resistance to the establishment of such magnetic lines than iron, and to produce the greatest number of magnetic lines with the least expenditure of current the greatest possible portion of the path of the magnetic circuit



FIGS. 1 AND 2.

should be made of iron and the smallest portion consist of an air gap.

The principle of the electric motor may now be explained by means of Fig. 2, which represents a model. The part marked A is a rectangular frame of iron, in one of the longer sides of which there is an air gap of substantially circular form, as shown. On the other long arm is wound a coil B of insulated wire. If an electric current is sent through the coil in the direction indicated by the arrows, it makes of the piece of iron a magnet with north pole at N and south pole at S. Within the air gap between the poles of the magnet A is located an iron drum D, which is supported on bearings and is capable of rotating around its axis within the air gap. This drum is wound with a coil of wire E. If a current be sent through this coil in the direction indicated by the arrows, it will make of the drum a magnet, with north pole at N^1 and south pole at S^1.

Now, according to the law that like magnetic poles repel and unlike poles attract each other, the point N^1 on the drum will be attracted toward the point S on the

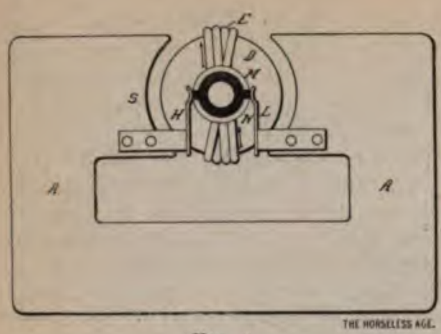


FIG. 3.

magnet A, and the point S' on the drum toward the point N on the magnet A; and if this force of attraction is sufficient to overcome the bearing resistance of the drum the latter will commence to rotate in a left handed direction, as indicated by the arrow. The motion would cease, however, when the poles of the drum came opposite the poles of the piece A, as will be obvious, for then the attraction between the poles N' and S and between N and S' would be exactly opposite in direction, and, as these attractive forces are exactly equal, they neutralize each other, and there would therefore be no force acting on the drum at all.

To make continuous rotation of the drum possible, the current in the coil E must be reversed at the moment the plane of this coil is in a vertical position. This may be effected as shown in Fig. 3. The arrangement of the drum within the gap of the magnet A and of coils on the magnet and the drum is the same as in Fig. 2. Upon the shaft of the drum B are mounted two metal segments, M and N, which are insulated from the shaft and from each other. To these two segments the ends of the coil E are connected. On the outer surface of the segments bear two brushes H and L, by means of which the current is led into the coil E. It will easily be seen that the current through the coil E reverses at every half revolution of the drum D. The reversal takes place at the moment the magnetic axes of the magnet A and the drum D are in line with each other. This point is a dead centre point, and there is absolutely no rotating effort on the drum D when in this position. However, when the drum is once set in motion its momentum will carry it over this dead centre,

FIG. 4.

and the model here shown would be capable of continuous rotation once it had attained a certain speed.

A motor built along the lines of the model Fig. 3 would be open to the objection that it would not be self starting, that it produced an uneven turning effort or torque, and that there would be much sparking at the brushes when the current was reversed in the coil E. To overcome the first two objections, a number of coils are used on the drum, instead of a single one, being distributed evenly over the surface of the drum, and the current is led into these coils by means of a device comprising as many insulated segments as there are coils. To overcome the difficulty of sparking at the brushes when the current is reversed in a coil, the two ends of a coil, instead of being connected to sectors located opposite each other, are connected to adjacent sectors. This method of winding the drum is illustrated in Fig. 4, which is an end view of the drum. The winding consists of twelve coils distributed symmetrically over the surface of the drum, and there are twelve segments in the commutator. One of the coils connects to the segment A at C. From this point the wire runs radially outward to the surface of the drum at D, along the surface of the drum, parallel with the axis thereof, across the back end of the drum, as shown by dotted lines, along the surface of the drum to E and from there to the sector B, adjacent to A, to which it connects at F. The next coil starts from this segment B.

The following are some of the technical terms used in the terminology of electric motors. The magnet A is called the field magnet and the parts of it located adjacent to the air gap are called the field poles; the coil of wire E is called the field coil; the drum D is known as the armature, and the coils of wire on it as the armature winding; the assemblage of sectors to which the end of the armature coils connect is called the commutator, and the brushes bearing on the commutator the commutator brushes.

A. C A. Affairs.

Dr. Ulysses Kahn lectured before the club last night on "Camp Life, Customs and Scenery in Abyssinia," illustrated with lantern slides. Dr. Kahn was for two years surgeon for Count Leontieff's Abyssinian exploration expedition.

The following named new members were elected on March 3: Active—Robert Walton Goelet, J. E. Ewing, Jacob Ruppert, Jr., F. A. Thomson and Raymond M. Owen; associate—Spencer Trask.

The committee is now at work on the rules governing the commercial motor vehicle contest, which is scheduled to be held some time in May.

The Champion Manufacturing Company, Brooklyn, N. Y., will place upon the market a full line of sliding gear transmissions.

LESSONS OF THE ∴ ROAD ∴

Four Years' Experience with Gasoline Machines in the Canadian Provinces.

By J. W. M.

As a very small boy, as far back as I can remember, the desire of my life was to have a carriage that would "go itself," but until I was about eighteen years old I did not have my wish gratified. At that time there were no motor cars on the market, so I started to get one built, and as we have engineers and carpenters about our factory the machine was undertaken here. The motive power was a pair of oil burning steam engines, the cylinders being 2x3 inches, and there being a boiler for each engine. The boilers were of the water tube type, and were intended to carry 150 pounds of steam. The carriage proper was rather of the sloven type, hung low with ordinary wooden wheels, steel tired, the front ones 44 inches in diameter and the rear ones 48 inches. The engine shaft had to be placed fore and aft, as there was not room for it to be placed crossways. There was a shaft with bevel gear between the engine shafts, and this shaft was geared to the driving wheels by chain. There were two speeds ahead, one of 4 to 1 and another of 8 to 1 of the driving wheels. This gearing was found very much too high, and was changed to 8 to 1 for high and 32 to 1 for the low speed.

One fine summer evening after two or three months the machine was finished and taken out for a trial (this was with the higher gearing), and found that the lower gearing would just take her up an 8 per cent. grade with 140 pounds of steam, and the high gear would only just move her on the dead level and good road. So we at once changed the gears, and the machine would climb a 15 per cent. grade, and on a good road would make about 15 miles per hour on a dead level, but would stall on the least up grade. The engines of this machine were far too small for the power required for the weight of this machine—1,600 pounds. The boilers were also too small, as it was impossible to hold anything like fair steam. This machine was run, I suppose, about 200 miles and then abandoned. It was built in 1884, and I have always been sorry that there was no photograph made of it, as it would be interesting now.

BUYS A GASOLINE CAR.

However, I was watching the motor carriage movement with the greatest interest, and after looking into the three powers I decided on a gasoline car of standard make and ordered late in '98. Well, after waiting what seemed a very long time (but, really, the makers were very prompt) the machine arrived, but as it was so late in

the season I did nothing more than start it, and in doing that the first time I managed to break the third finger of my right hand. I was so much excited I really do not know how it happened, but suppose the engine must have kicked back. But I still stuck to the machine with my broken hand and managed it all right.

My first regular experience was not begun until the spring of 1899, when I took the machine out of the stable, which is near the house, and to get back to which you have to climb an 18 per cent. grade. After a lot of cranking I got the machine to go and ran down the hill and up the road at top speed, and as this was my first experience at high speed the machine wobbled rather badly. Anyway, I soon got used to it and ran straight. When I came back home again I thought I would try her on a light hill of 9 per cent. grade, but the carriage stopped right in the middle of it, and the motor kept merrily running on, which showed the friction clutch was loose. There were at least 100 people out watching the new fangled machine, and when it stuck on as light a hill as Esson's the word was, "What a pity, J. W. M.'s carriage is a failure," but when I got at the clutch with a wrench I soon showed them that it was not a failure. But when I wanted to take the carriage home I had to climb that 18 per cent. grade, and I had also to submit to the ignominy of being pushed up the hill the first time I came home. It must be remembered that this carriage was the first gasoline machine I had ever handled, and as I started it without any instructions it is a wonder the machine did as well as it did.

ECCENTRIC RUNS HOT.

Anyway, in the afternoon I put on my thinking cap and decided to experiment with the gasoline feed, and started by finding that the needle valve did not seat and the engine was flooding. So I fixed this and tried her out on the road again, and she climbed the hills without any effort. The next day or so I decided to try the machine on a longer trip, so I got our chief engineer to go with me. Everything went fine for about 8 miles, when on examination I found the eccentric that drives the counter balance hot, so loosened it a little and started again; but it still ran hot for some time and I have since found the eccentric pulley out of truth. When we had gone about 10 miles we struck what we call frost holes that could not be avoided, and besides I did not know then the calamity of being caught in one of these. When we got half way through the first one we did not get any further, as the machine was down to the axles. We had to rob some fences to get her out, and then it was all the two of us could do. Well, this thing happened three times to us before we got home, as it was early spring. This was my first drive of any length and it was work your passage with a vengeance. I suppose some people would have been disgusted, but I had the fever too bad for that.

The next day there was to be some public function at Newcastle, a town 8 miles from home, and my wife and I decided to go in the "carriage." So I put on my good clothes, as I did not expect to have any trouble going that short distance, and besides the roads were fine, and then I wanted to let the people down there see my new carriage, as it had been written up in all the local papers and some of the principal provincial ones, too, as it was the first modern automobile in the Maritime Provinces.

Well, as I have said, we started in all our finery and got about 6 miles out when—W-h-i-r-r, and I stopped as soon as possible, and on examination found that the bolt that holds the chain at proper tension had gone and, of course, the nut on it had fallen into the differential. You can imagine my feelings, as I thought the gears would be all smashed, but on looking into them I was glad to see that they were all right. By this time bicycles, teams, and even people on foot began to arrive, having started out to meet the horseless carriage. By this time I had fished out the nut and bolt, and it had been so "chawed" by the gear that it would not enter the thread again. I saw a friend of mine in the crowd with a bicycle, and he offered to go to Newcastle and get a new bolt for me. He returned in about half an hour, the bolt was put in again and we got under way after a wait of about two hours, with all the people that could keep up following us.

DRAWS A CROWD.

I arrived in town all right and one never saw a circus strike a country town that attracted more of a crowd, and the remarks of the small boys were certainly amusing. I remained in Newcastle all that night and got home without any more trouble the next afternoon. But you may be sure I had every bolt and nut pinned that I could get at. I think that was about the last bad luck I had for some time.

As time went on and I got so I could manage the machine fairly well I began to think I would like to take a trip of some little length, and as I had a cousin in the marine engine building business I thought to get him to go with me and at the same time to convert him to the gasoline engine. We decided on a trip to a place where we had another factory, called Mortimore, and as we cannot buy gasoline outside of large towns here, we had to arrange to carry our supply with us. This I did by fastening a 7 gallon tank in front of the dash and supported on the carriage frame.

THE FIRST LONG TRIP.

Well, on a pleasant June evening I started for Chatham, intending to pick my cousin up there and start on our 85 mile run in the morning early; but we were both lazy and did not get away until 8:30. The first part of our run was to a place called Richibucto, 42 miles from Chatham, and we made the first 33 miles in fine shape, and, not meeting many teams, made good time. I might say here that the first few days I had the machine I noticed that horses were going to be much frightened at it, so decided to not only stop the carriage but also the motor when meeting one, and this I have kept up in all my four years' experience, with the record of not a single accident of any kind and the good will of every person I meet, and only once in the 14,000 miles has an unkind word been said to me. Well, we made these 33 miles, and stopped and watered up at a place called Kouchiboguac, then kept on and arrived in Richibucto for dinner at a few minutes to 12.

A STEEP CLIMB.

As Jim had to see some people in town he had built a tugboat for, we were there about two hours, when we started on the last 30 miles of our trip. We found the next 18 miles fine road, and went along in fine shape, until we came to a hill at Bass River that looked very steep. I said to Jim that he had better get out, as it was too steep for the machine with both of us in, so he got out and I started to climb it, but the machine only went half way up and stalled. So I backed her to the bottom again and tried it a second time, but with the same result. Then I thought perhaps the gasoline mixture might be wrong, and made an adjustment for less oil, but when I tried to start again I found to my horror that I got no compression. I thought the spring on the admission valve had broken—I had no spare one with me—but on closer examination I found that in making the gasoline adjustment I had slackened the spring, and on fixing that started to climb the hill, but with the same old stick. I saw by that that it was not in her to climb the hill, even with Jim pushing with all his might behind. After waiting a little while a few farmers came around, and with their help we got to the top. I went to that hill again on purpose to measure it, and found it a shade over 25 per cent.

We went about 5 miles further and stalled on another hill, but with a little coaxing we got her to the top. That, however, was the last excitement of the day, as we arrived at our destination in about twenty minutes, or about 4 o'clock in the afternoon. Our actual speed for the trip was a little over 14 miles per hour. We remained there the next day, and took almost everyone in the place out for a drive, and every person was pleased with the experience.

DIRECTED THE WRONG WAY.

On Wednesday we started on our return journey, but when about ready to start found one of our rear tires soft, so pumped up before getting under way. We also inquired whether there was any way to avoid those awful hills in returning to Richibucto. Our friend, Mr. T., told us to take the West Branch road, which was a little longer, but was a fine road, and had few if any hills, "but," said he, "do not take the shore road, as it is the worst road in New Brunswick for hills." So when we got to the turning off place Jim asked

a man in a field about the proper road. He said "Take the road to the left," and we took it—to our sorrow, as it was the shore road. We did not know it, however, until we got to Richibucto. Well, we went for a few miles and then came to a hill, and we stuck on that hill and were on it for more than half an hour. When we got to the top of the hill we found the tire that was soft in the morning flat, so we pumped it up again. Then it became covered all over with blisters, and was flat again in less than a minute. So there was nothing to do but run on the flat tire, as we were about 50 miles from anywhere, and had started out prepared only for punctures, and this was evidently leaking through the fibre.

Well, we went about an eighth of a mile further, when we came to another hill and went through the same performance, and in all we were stuck six or eight times in 4 miles. But toward the last of it I got into the way of getting out by starting the motor, throwing her in gear, and steering from the road, which permitted of both of us pushing. In doing that we managed much better afterwards. When we had gone a few miles farther we came to where they had taken up a bridge and we had to go over the bank, ford the stream in 18 inches of water and then climb the bank on the other side, that was almost a mountain, but the men working on the bridge kindly gave us a push up, else I believe we would have been there yet. We got under way again and arrived in Rexton in time for a late dinner. While there the worst thunder and rain storm I ever saw came on, so we decided to stay all night, as the idea of running in mud with a flat tire was not very pleasant.

TANK SPRINGS A LEAK.

While there we tried to fix the tire by pumping thick molasses into it, and the next morning we thought we were all right, as it was still hard. We got away from Rexton at 9 o'clock and had only gone half a mile when we found our water tank empty. It had sprung a leak in the joint of the tank where the solder had broken. So we filled up again and started for Richabucto, where we knew there was a tinsmith, but we had not gone five minutes longer before the tire was flat again. Surely our troubles were coming on us thick and fast. We got to the tinsmith's place all right, and he did the best he could to fix the tank, but the moisture was still there and would not let the solder take, and we did not want to take the tank out, as that was a big job.

After a lot of work he got the leak mostly stopped and we started on our 42 miles to Chatham. After getting about 2 miles out the motor began to miss and finally stopped. I thought at the time it was caused by there not being enough gasoline in the tank. After filling and trying again to start, it would not ignite properly, so I set the contacts to a firmer pressure and tried again, and after a little more trying it started up all right. I did not find out until late in the fall what was really the trouble. We went as far as Kouchibouguac for dinner and when we started on the last part of our trip home we found the flat tire was cut almost in two by the rim. But everything went as well as could be expected and we got within a few miles of Chatham when I felt a sort of a tug, and on getting out found the cut tire off the rim and wound around the hub and shaft. So we cut it off and ran the rest of the way into Chatham on the bare rim, which bent it rather badly. As it had begun to rain a few miles back and I still had 15 miles to get home from Chatham, I decided to leave the machine in Chatham until I got a new tire and the weather was better. I was lucky enough to find our yacht in town, so got home all right.

MOTOR BALKS.

In a little over a week the new tire arrived and I got a friend of mine to come with me and put it on, as he had considerable experience with bicycle tires. When it was in place it was raining very hard, and as it was late in the evening we decided to leave the machine in there a little longer, so we went home and came down again the next day and started for home about 6 in the evening, with my uncle for a passenger. He was rather frightened at the high speed we went at, but soon got used to it and enjoyed it thoroughly. When about 7 miles from home the motor began to miss, right at the bottom of a steep hill, and would not climb it. I think I worked at least two hours over that engine trying to adjust it and trying everything I could think of, and I had just made up my mind to get a team and drive home when the confounded thing started up and went up the hill and home like a streak, after taking four hours to do 15 miles. I can tell you I was rather discouraged with my first trip, but with all our trials the machine brought us home after covering in all about 200 miles.

I then had a lot of trouble with the motor kicking and wrote the makers, and they told me they thought the batteries had run out, so I connected up some wet ones I had here and tried them, without any improvement. I had to go to Europe then, so did not do anything more to get her to work. I forgot to say that the new tire put on in Chatham was flat before we had gone 8 miles, but I put some "leak stop" in it that fixed it up for the time being. When I arrived home again the first thing I did was to order a new set of batteries and set them up, but the motor did not do any better, so I knew the trouble had to be looked for somewhere else. I thought perhaps there might be something wrong with the contacts, as it was the make and break type, so took the sparking mechanism out. It looked all right, however, so I put it back again, but the engine did not work a bit better. I took the sparker out again, and in doing so something happened to scrape the contact points (which looked good and bright) and when I put her together again I was delighted to see her working the best she had ever done. So this simple little thing had bothered me nearly all the first summer I had the machine, and, strange to say, up to that time I had never seen in print the absolute necessity of keeping the contacts more than looking bright and all right. This I found out by actual experience, and ever since have made it a point to see to the contacts very often.

CONTINUED TIRE TROUBLE.

As all my people were away from home I thought it would be a good time to have a few days out of the carriage, as she was working so well. So I got Jim and Byron up to see me and we covered about 200 miles in three days and finished with a night away with the machine, but when I came to start home the next day I found the tire that I had doctored with "leak stop" soft again. This time I made a stiff paste with boiled flour and pumped this in the tube, and it stood me for about two weeks and then gave out again. As I had so much trouble with these tires I decided to try something else, and as there happened to be a traveler for a double tube tire company in town I ordered a set from him. They arrived early in the spring and I put them on and on the first trip one came off in the first two miles I ran. The inner tube had been cut on a strip of canvas that had been fastened to it as a protection. Anyway, I worked away with a friend of mine all that day, but could not get it to stand for more than a mile at a time, and it must have been two months before they began to stand at all. I must give the makers of these tires credit for being most fair, as they always sent me parts without asking, as soon as they knew there was anything wrong.

A 400 MILE TRIP.

Well, when I got everything to go all right with the tires I longed to get away on another short trip, so asked Byron (who was much interested in the motor) to come with me. And in talking it over we decided to go to northern New Brunswick, as he had been over the country with a bicycle and found the roads good. We had to arrange to take more gasoline this time, as we were intending to cover in all over 400 miles. So I got another tank added in front and with this I could carry altogether 15 gallons, and I also arranged to have some more sent to Bathurst. We got away on a fine afternoon in August and drove 44 miles the first four hours, but found the two rear tires beginning to rim cut rather badly. We were up early the next morning and put in some strips to protect the cases where they were cutting and started on our way. We arrived in Tracadie in about three hours, and as Byron knew a chap there we stayed there to dinner and then hunted up Ray and persuaded him to come with us, Byron taking a bicycle and Ray coming with me. Here I wanted to telegraph home, so Ray came with me to show me the way to the office. On the way I noticed a cart with some fellows in it coming toward us, and as there was a wide shallow pool of water

on the side of the road, they drove into it to let us pass. I saw their horse was frightened and stopped for them to pass. One chap was sitting on the tailboard of the cart, and just as they got opposite us their horse jumped ahead and Mr. Man's heels went up in the air and he turned a beautiful half turn and landed in the water on the flat of his back. We got away as soon as we could, as we did not know what his temper would be, but Ray said his eyes never left the machine all through the fall as though he never expected to see one again.

We got started on the next stage of our trip in about an hour, and decided to spend the night in Inkerman, 15 miles further on. When about 4 miles from our destination we felt the machine riding a little rough, and got out and found one of the rear tires soft. As we had such a short distance to go we did not want to take it off, so got out and pumped it every mile, and in doing this arrived at the hotel and found Byron there waiting for us. We found the tire case so badly cut again here that we decided it would not be safe to go any further without trying to fix it a little.

CALFSKIN PROTECTORS.

So we hunted up a cobbler and got strips of good strong calfskin sewed on so the rim came on the calfskin where it was worst cut instead of on the damaged case. We found on our next day's run that it was a splendid makeshift, as the cases did not cut as badly as they did at first. We did this cobbling act every evening while away, and got the cases about covered on both rims, and I do not believe we would have gotten home on these tires if it had not been for doing it.

The next day we went to Shippigan and back to Inkerman again, over the worst roads it had been my bad luck so far to get on, but the motor and whole machine did not flinch a single second. The next day we went as far as Caraquet and found a church picnic going on, and as Byron knew the people there we stayed and had dinner, and left in the evening for our 7 mile drive to the hotel in Caraquet town. We were up and had our machine fueled and watered the next morning, and were ready to start at 7. We went within 15 miles of Bathurst, and as neither of us wanted to go into the town much, we decided to turn back and spend the day loafing about the country, and as Byron had come prepared with eatables we had our midday meal beside the road at a nice spring. We then started so as to arrive at Inkerman in time for a late tea. The next day we were about the hotel most of the day, and only went over to Caraquet again for a drive, and to get some gasoline that had been sent there for us.

We started on our 85 mile drive home the next morning at 8, had dinner with Ray in Tracadie, and arrived home at 8 in the evening. It was a lovely moonlight evening, and in driving through some heavy woods I saw a white flash across the road, and found it was two ladies with a white horse, which bolted with them over the ditch and into the woods, but I got ahold of it before it had done any more mischief, and after seeing the ladies safely on the road I started for the last 4 miles of my trip. We covered in all over 400 miles, and the engine did not give the least trouble at any time, the only trouble being the tires rim cutting.

REPAIRS DURING THE WINTER.

I did considerable running about home the rest of the fall, but had to get a set of new cases. About the only thing I did to the machine that winter was to put in dry batteries, and as I only got about 200 miles out of the first set I decided to try a sparking dynamo. I got one and had our engineer put it in, and it worked beautifully from the first, and in great contrast to some experiences of writers in THE HORSELESS AGE, as from beginning to end the little dynamo never failed, and always did just fine work.

The summer of '91 Byron and I went over about the same ground as we did the summer before with less side trips, but went a little further from home, and covered about 300 miles. On this trip we had trouble with both tires and motor, but nothing to speak of with the latter. When on a back road settlement, about 120 miles from home, we were both startled by a vicious report, and it turned out to be the casing of one of the rear tires torn away from the wire that supports it. When I saw what happened, and realizing that we had foolishly come away without a spare case or any way to repair such a burst, I said, "What under heaven are we going to do now." We decided to run on the rim and trust to luck that we would come to a farm house before very long, and our luck was with us, as we came to a good place in less than half a mile.

REINFORCING A TIRE CASING.

While we had been coming to the farm I had been thinking what would be the best thing to do, and after jacking the machine up and taking the case off we stripped the rubber back from the fabric and cemented a piece of strong duck to it—that is, between the rubber and the fabric, and then around the wire, and cemented again on the inside next the tube, then sewed it through both and then fastened the rubber down on the fabric again. It was just dark and we had to go 5 miles to a place they took people for the night, and it was with fear and trembling that we started, as it was an experiment and we did not know whether it was going to stand or not. We got to the house all right and found it a fine place with a good piano, and as Byron plays well we had a very pleasant evening. This tire bursting bothered us all the trip, as we had it off and fixed fifteen times in 150 miles, and this with a 1,600 pound machine is hard work. Our patches never gave out, but the casing always gave way in some new place. To show how expert one will get at this sort of work, it took us two hours and a half to make the first repair and we did the last one in thirty-five minutes.

Two days after this we were going along in fine shape when suddenly the motor stopped and would not start again. On snapping the wires together I could get a good spark and could find nothing out of adjustment, until when handling the sparker I found the arm went much farther than it should. Then I remembered that I had got a new platinum point soldered on a month before, and, of course, it must have worked off, but fortunately the adjustment was such that I could bring the arms in contact, and she brought us to Inkerman in that way all right. The next morning I took the sparker out and got a small hole drilled through the arm and put a steel point in, and that point is still there, having run about 1,000 miles since.

IGNITION TROUBLES.

The next day I had more troubles with the ignition. At a place where we stopped for water I thought I would tighten up the contact a little, and evidently forgot to tighten the nuts again, as after a few minutes the motor stopped. It showed a good spark, and the contacts would come together, but I could only get an occasional explosion. The minute I tried to adjust the contact I saw the trouble and I had no further engine troubles on that trip, but no end of tire difficulties. As I said before, I had a sparking dynamo on the carriage this trip and also a set of batteries, but only used them to try for ignition troubles, as the dynamo would start the motor on the crank. We arrived home the next evening all right, after a lot of hard work on the whole trip, but we both decided we had a good time and would rather go over the same troubles and roads in the motor than after a horse.

I did not attempt any long trips again that fall, but covered a lot of ground about home. One day while in Chatham at the machine shop the foreman, in looking her over, said there was a broken bolt at the rear end. I found it to be the distance rod that tightens the chain, and as we were at the right place to get it fixed we had it done right there. This was the third time I had trouble with this adjustment of the chain gear, and had only run about a week more when it left me again about 4 miles from home. This time it had broken in the middle of the thread and I simply screwed half the depth of a nut on each broken end, and as the nut would then connect the two ends of the bolt and make it practically solid, it brought me home all right.

PURCHASED A LIGHT GASOLINE CAR.

That fall and winter I had heard a lot about a light gasoline machine, and decided to see it for myself, and if I was pleased with it to get one. So in March I happened to be in the city it is made in and had a drive on one, and was well enough pleased with it to order one, which arrived toward the end of April. But as I

was away from home then, and did not arrive back until the end of May, it was not tried until then. It was a medium weight machine, weighing about 900 pounds, and with a 4 horse power motor. I had no trouble getting this machine started, as it went off on the first turn of the crank, and worked well for about two weeks. One day my wife and I were going to town, and when about a mile from home I found one of the rear rims opened up at the brazing. As we were very anxious to get to town we thought we would take the old machine. Well, after putting on all the tires (I had not had her out that spring at all) we started, but that trip was about the worst experience I have had. To get to the place we were going to we had to cross the Miramichi River, a large river, and as the Government were renewing the bridge we had to cross in a scow. As usual, the landings were not as they should be, the scow came end on to the wharf, and there was a very steep and rough approach. I made a rush at this grade, as I knew it would be all the machine could do to get to the top, and when about half way up two gears on the transmission came out of gear, and the carriage with a tearing noise ran down the approach. The scow had in the meantime left the wharf at one end, leaving clear water 20 feet deep right under my rear wheels. I tried my best to hold her with the emergency brake, but it only partly stopped her. There were some men looking on, and they promptly got hold of her and pushed her to the top. My wife, who had got out before I tried to land, was singing out, "Jump, Jack, and let the carriage go!" but I stuck to the wreck. I got the gear in place again and finished my journey all right. On my return trip I went a long way around to avoid that ferry.

SMOKINESS AND LOSS OF POWER CURED.

When I got the new machine out again it would run well for about half an hour, and then begin to lose power and the exhaust smoke, and it was impossible to adjust the fuel feed. That showed me she was getting too much oil in some way, but the trouble was to find out where. Things went on in this way for a few days, until one day I was going to a town 15 miles away. The first 5 miles the machine worked fine, and then began her old tricks of smoking and stopping. I worried away until I got to my journey's end. This machine has an overflow connected from the mixing chamber to the bottom of the tank, and I thought perhaps the vent from the tank was too small to let off the gas that would form when the machine had run far enough to get heated, and the gas of the gasoline would form pressure enough to drive the gasoline up this overflow into the mixing chamber. I got a small hole drilled through the filling plug, and my theory must have been right, as the same trouble has never appeared since.

My next trouble was with spark plugs, this machine having jump spark ignition. The engine would miss fire and stop, and on examining the plug the spark would pass between the points in good shape, but it must have short circuited under compression. This gave me a lot of trouble, as it made one look for trouble some place else. I put in a new plug as an experiment, and the machine went off all right.

A LONG TRIP WITH THE LIGHT CAR.

Last September our engineer and I thought we would like to take a trip, so we decided to go to Fredericton, the capital of the Province. We left fitted out with 100 pounds of spare parts, tools and gasoline. We intended to get away at 5 in the morning, but when I went to start the motor it would not start, and I lost about half an hour before I found the buzzer out of adjustment. After getting started I had too much gasoline in the tank, and as it flooded the vaporizer I had to run some off. We had no further trouble, and made the 100 miles to Fredericton in ten hours running time without a hitch. The roads were very heavy about all the way, and we were surprised to find it an average of an inch and a half of mud for 60 miles of the distance. We broke a pump spring on the way, but we made a makeshift repair with a loop of stove pipe wire between the two shafts, and this used to stand us about 30 miles each time. The next day I took the carriage to the carriage builders to get a mud guard fixed, and while there I found twelve spokes broken in the rear wheels, and the rest about all loose, so I got the engineer of the Dow Automobile Company to put them in for me.

We decided to go on to Grand Lake and home by way of Richibucto and Chatham, so we left Fredericton about 4 in the afternoon and drove 35 miles that afternoon. We got away again early the next morning, and went through the Grand Lake coal fields and over some fine roads, but in the afternoon we struck some roads that—well if I had known them I would have gone home the other way. However, we got to Mortimore about 4 in the afternoon, and stayed there all night with my friend, Mr. T., and got away again about 10 the next morning. We had just magnificent roads for the next 60 miles, but encountered two hills and we had to use every means we could think of to get up them. We had dinner at Kouchibouguac, and just as I was turning the machine in the hotel yard I heard a noise in the gear, but we kept on, trusting to luck that the fibre gear would last until we got home. Everything went well for about 20 miles, or 8 miles from Chatham, when climbing a light hill the

GEAR GAVE AWAY AND JAMMED

so the engine would not turn. On looking it over we decided it would be impossible to do anything on the road, so we took the chain off and got a team to tow us to Chatham, and I cannot say it was a pleasant thing to come into a large town where one knew every person in it behind a truck wagon and a team. We left the machine there and drove home 15 miles further. In a few days we took a small barge down and towed the machine home by water, as I could not stand the idea of having it towed home by horse power through the country where I know every person.

We then put in a set of bronze gears, and although they make more noise, you feel as though you were going to get home all right. However, I will not go on any more long trips again without more spare parts. I have covered quite a lot of ground since that trip, but the machine has not been developing as much power as it should, but I find the cam shaft that works the valves worn badly in the bearing, and that, of course, makes the valves open late and close early, besides reducing the lift of the valves.

SUMMARY.

My experience in general touring is such that I would like to see all machines with three speeds ahead at least, and if possible have them arranged so that when one comes to any of those very bad hills one could have a special gear that would have power enough to lift the machine bodily if necessary, as when one comes to one of these grades with a lady for a passenger you can do nothing, as they cannot help up as a man can. My wife has got about as enthusiastic as I am about the motor carriage. She can handle it fairly well and is always anxious to go on one of my trips with me, but my past experience with steep hills makes me feel rather uneasy about it. As to the country people, I have always found the best of good humored interest among them, and if you treat them right they will treat you right. I always stop when meeting ladies driving alone and lead their horses by for them. Although I have had a lot of trouble with my fad (I sometimes think I have had more than my share), still the pleasure far outweighs it and I would be very sorry to have to be without a motor carriage. In my notes I have perhaps dwelt more on the troubles than on the pleasures. Still I have had the machines run without any fixing for months. I have also added a volt and ampere meter to my outfit and find them very useful.

Book Review.

"The Darracq and Its Management." Compiled by Archibald Ford, Liverpool, England. The book contains a large number of illustrations and sectional drawings, a glossary of French terms of the several parts, practical driving instructions and hints on the care of the car, etc. The author claims that "once this book has been thoroughly mastered the pupil has obtained a splendidly theoretical knowledge of how to drive any motor car."

Work has been begun on a two story brick and steel automobile repository, 30x164 feet, at Washington, D. C., for Patent Examiner Sanders.

Rules of the Paris-Madrid Race.

The rules for the racing section of the Paris-Madrid "course" have recently been issued by the sport commission of the Automobile Club of France, and a translation is given in the following:

This race will be held under the general racing rules of the Automobile Club of France, which have been accepted by the Royal Automobile Club of Spain.

CLASSES.

This race is international and is open to the following four classes:

Class 1, vehicles weighing between 650 and 1,000 kilograms.

Class 2, vehicles weighing between 400 and 650 kilograms.

Class 3, vehicles weighing between 250 and 400 kilograms.

Class 4, vehicles weighing 50 kilograms and less.

Vehicles in the first two classes will carry at least two passengers side by side, of a minimum weight of 60 kilograms (132 pounds) per passenger, it being understood that in case the weight of one of the passengers is less than 60 kilograms the difference is to be made up by ballast.

The weight of the vehicles of the different classes is always taken empty. By "empty" is understood without passengers, without supplies (coke, water, gasoline, accumulators), and without tools, spare parts, baggage, clothing and provisions.

Vehicles which are provided, for ignition purposes, with a generator of electricity driven by the motor are allowed an excess of weight of 7 kilograms. The weight of lamps, lamp brackets and of horns is not comprised in the weight of the vehicle.

Vehicles of the two first classes must have aboard for the whole duration of the race a member of the Automobile Club of France, of the Royal Automobile Club of Spain or of a club recognized by these. This person will be responsible for all deviations from the rules.

START AND ARRIVAL.

The first day the vehicles will be started in the order of entry number, at two minute intervals. The second day the vehicles will start in the order of arrival on the evening before, at two minute intervals. At the end of the second stage a provisional classification will be made, giving the five first vehicles since the start from Paris. The last start will be made under the following conditions:

For the five first vehicles the intervals will be those given by the provisional classification, with a minimum of two minutes and a maximum of fifteen minutes. The rest of the vehicles will be started in the order of their arrival the previous night, at two minute intervals.

At the end of each stage the commissioners and the timekeeper will make out a list of the starters for the following morning, as the vehicles arrive one after another. This list will be posted at the gate of the control park, so that the contestants may become acquainted with it at the earliest possible moment. The international commission will at a later date fix the hour of start for the first vehicle in each stage. The end control of each stage will be closed the day after the start at 3 o'clock a. m. Vehicles arriving after that hour will be neither controlled nor classified. The commissioners and official timekeepers must insure permanent attendance of the employees at the end controls of each stage and also the supervising officials at the parks, which are referred to below.

The distance between the parks and the cities will be neutralized (if this be necessary) in the same manner as the course through the cities, and in covering this part of the route the contestants must comply with Article 6 relating to neutralized sections. The control keepers must make out a report of arrivals and starts, stating the exact time of arrival and start of the vehicles. They will retain one copy of this report themselves and send within twenty-four hours one copy to the secretary of the sport commission of the Automobile Club of France, 6 Place de la Concorde, Paris, and one copy to the secretary of the Royal Automobile Club of Spain, Madrid, 1 Calle del Duque de Rivas.

PARKS.

The race will take place under the rule of absolutely closed parks. This is meant by the commission as follows:

At its arrival at a park each vehicle will proceed to the place which is assigned to it by the commissioners. The occupants of the vehicle will immediately descend from the vehicle, stop the motor and leave the park, without performing any other operation whatsoever. Hence the only operation permitted in the parks in the case of a gasoline motor is the stopping of the motor by interrupting the ignition or by extinguishing the burners. The operation known as purging the cylinders, consisting in injecting a little kerosene into the cylinders of the motor while it is still warm, is permitted.

In the case of a steam vehicle the only operations permitted are extinction of the burner and blowing off of the boiler.

With the exceptions of the operations above mentioned (the duration of which must in no case exceed one or two minutes) all work, all lubrication, all replenishment—in one word, every sort of operation—are vigorously prohibited. The following morning the occupants of each vehicle will be admitted to the park at the official starting time for that vehicle, and the running time of the vehicle will be counted from that moment. The occupants must get their vehicle in operation and leave the park without any other operations. In case a vehicle is incapable of starting at the end of two or three minutes at the maximum, the commissioners must have it pushed out of the park by hand. It is well understood, however, that the running time counts from the moment the occupants entered the park.

The time occupied by replenishment of supplies, lubrication and operations of any other nature whatever will count as running time. It is prohibited to perform these operations within the parks. Entry to the parks is strictly prohibited to all persons, except, first, the general and local commissioners; second, the occupants only of each vehicle (the force which each manufacturer may have on the road to aid the occupants of the vehicle in their repairs and replenishment of supplies must remain outside the park, as none of these operations are permitted within the park); third, a certain number of men appointed by local commissioners, who, in case of necessity and upon the order of the commissioner charged with the supervision of the park, must push out of the park by hand any vehicle incapable of starting under its own power.

The general commissioners must wear a red arm band, the local commissioners a blue arm band with red border, the control keepers a blue arm band, and the force appointed by the local commissioners for service at the parks a yellow arm band. The permanent presence of a commissioner at the park is absolutely indispensable.

NEUTRALIZED STRETCHES.

A certain number of localities requiring the contestants to pass at a very reduced pace, the following arrangements have been adopted to insure this reduction of speed and to make it equal for all: At the beginning and end of each neutralized section will be established a control, where the contestants must stop. Every contestant who has passed a control without stopping the time required by the organizers of the race will be penalized a number of minutes equal to the total time of neutralization, provided he can prove that the control keepers were not yet or no longer at their post. In case he is not able to furnish such proof, he will be penalized three times the number of minutes of the total time of neutralization for that control. He may even be disqualified if the commissioners are of the opinion that the control was ignored intentionally.

The distance from the park to the end control or to the end of the city will be neutralized, if necessary, in the same manner as the course through the cities.

To facilitate rapid control of time in the race the following arrangements have been adopted: Each vehicle will be provided with a box of uniform model for carrying the time cards (fiches) for the control. These boxes will be furnished to each contestant by the Automobile Club of France against the deposit of a sum of 10 francs at the weighing of the vehicle. This sum will be returned to those who, within a period of fifteen days after the race, have returned these boxes in good condition to the Automobile Club of France. At his arrival at the control where a neutralized section begins the contestant stops, and

the control keeper writes upon a card the time of his arrival, and opposite this the time at which he should start from the control at the end of the neutralized section. This card will be handed to the pilot referred to hereinafter, or otherwise to the operator of the vehicle, who carries it himself to the control at the end of the neutralized section. The control keeper also inscribes upon his control record the time of arrival of the vehicle.

As soon as the time card has been made out (and the commisisoner must complete this formality with the greatest possible dispatch) the contestant continues his trip by following the pilot at a distance of 20 to 30 metres, which he must not overtake under any pretext. He will thus arrive at the control at the end of the neutralized section and will there stop. The control keeper inscribes upon his own record sheet the time of start and puts the card handed him by the pilot into the box of the vehicle a few moments before the start. In case a contestant finds himself behind his schedule time at the end control of a neutralized section, he must still stop to have his card put into the card box by the control keeper. In that case the control keeper, before placing the card in the box, writes upon his record sheet the normal time of start, which has been inscribed upon the card at the entrance to the neutralized section.

The pilots must run through the section a number of times previous to the race in order to be able to well regulate their pace, so that a contestant may not have to wait more than two or three minutes at the end control of a section; but they must never lose sight of the fact that their presence ahead of the vehicle is intended to prevent the vehicle from traversing the section at a speed greater than allowed by the rules, and they must consequently not accelerate their pace under any pretext. The contestants, on the other hand, must conform absolutely to the pace set by the pilot and not approach too closely, but allow him an advance of 25 or 30 metres, so that he may freely regulate his speed.

The contestants are notified that the International Commission is determined to apply the present article of the rules most vigorously and to penalize those among them who overtake or molest their pilots in any way.

If two vehicles arrive together, the pilot of the second vehicle must proceed at least 50 metres behind the first vehicle, and at the end of the section the control keeper must let the first vehicle get a start of 50 to 100 metres before starting the second.

If, during the passage of the neutralized section, the pilot is unable to continue by reason of some cause beyond his control, such as a breakdown of his bicycle, etc., he mounts, if possible, the vehicle which he ought to precede, and if that is not possible he hands the time card to the contestant, who continues at a moderate pace and himself hands the time card to the control keeper at the end of the section. The pilot himself must inform the control keeper at the end of the section as soon as possible of the incident that has occurred.

After all the contestants have passed, the two control keepers at the beginning and end of a section make out a short report, stating that everything passed off in accordance with the rules, or, in the contrary case, mentioning any infractions of the present regulations and making any observations they may consider apropos. They will without delay send by registered letter one copy of this report to the secretary of the Sport Commission of the Automobile Club of France and one copy to the secretary of the Royal Automobile Club of Spain.

TARIFF.

The contestants will have to conform with the final decisions of the commission, which will do its best to obtain the greatest facilities for the passage of the frontier.

NUMBERS AND STAMPING.

The vehicles must carry their entry numbers painted in a conspicuous and durable manner at each side, at the front and rear, in letters at least 25 centimetres (10 inches) in height for the vehicles, and 15 centimetres (6 inches) in height for the runabouts and cycles. They are not allowed to carry any advertising signs. The following parts will be stamped:

In the vehicles of the last three classes, the axles and hubs; in the vehicles of the first class, the motors (cases, cylinders, combustion chambers), the frame, the wheel hubs and the rear axle.

All vehicles must present themselves to have these stamps applied at the Automobile Club of France, 6 Place de la Concorde, at the date and hour which will be fixed by the commission at a later date. No vehicles will be started the parts of which have not been duly stamped. Every replacement of stamped parts is expressly prohibited, and may result in the disqualification of the vehicle. The card boxes referred to above must be placed at the right of the vehicle and solidly attached in a conspicuous and easily accessible place. The commission reserve the right to have the location changed if it appears to them ill chosen, and to have the mode of the attachment changed if it seems defective to them.

ENTRIES.

Entries are received by the Automobile Club of France and by the Royal Automobile Club of Spain, beginning January 15. All entries received by the two clubs between January 15 and February 15 to 6 o'clock p. m., will participate in an assignment of starting numbers by lot. Beginning February 16 contestants will be assigned numbers in the order of their entry.

The entry fees have been fixed as follows: First class, 400 francs per vehicle; second class, 300 francs; third class, 200 francs, and fourth class, 50 francs. Entries will be received until April 15 under regular conditions, and from that date on entry fees are double. The entry lists be definitely closed on May 15 at 6 p. n

Any person entering a single vehicle der his own name is not required to n tion the make. Such person, to rec consideration in the final classificat must be aboard the vehicle himself for entire time of the race. Every person tering several vehicles under the s name must at the same time state the m of the vehicles which he enters. He is quired to furnish the name of the oper before 6 p. m. on May 15. Every veh for which the name of the driver has been registered with the organizers of race previous to that date loses its ri of entry and will not be given an off start.

TEAMS.

Outside the individual classification each vehicle it has been decided to pro for a classification by teams (equipes). this end the manufacturers may design four among the vehicles entered by th in any class to constitute the team of firm. This designation of the team n be made at the latest on May 20, o'clock p. m. Each manufacturer designate only a single team in each cl After the above date no changes will allowed in the teams designated.

CLASSIFICATION BY TEAMS.

There will be a classification by team follows: In each class there will be a mary classification in four groups in following order:

First group, teams of which four vehi arrive out of four.

Second group, teams of which three v cles arrive out of four.

Third group, teams of which two vehi arrive out of four.

Fourth group, teams of which one veh arrive out of four.

In the first group the teams will classed according to the aggregate tim the four vehicles. In each of the o groups the classification will depend u the aggregate of the distances run, it b understood that, for the vehicles which not complete the race, the distance t ran will be counted to the last contro which they were timed.

SIGNALS.

The commission will do its utmost have the route well demarcated by m of triangular orange colored signs, point of which is placed in the directio running. However, it declines all respo bility in this matter, and the contest should make it a personal matter to bec acquainted with the route.

A yellow flag signifies an obligatory s and the contestants must obey it. A flag signifies slowing down for a dange passage or passage through a conges not neutralized. Blue flags are placed metres ahead of the point to which the si refers. The yellow flags are placed at very point where the stop should be m

The control will be indicated by a sheaf of three flags, two with the national colors, on each side, and in the middle a yellow flag, the same as at places of obligatory stops. In addition a strip of cloth bearing the word "Control" will be placed across the road at a certain height. The control keepers and timekeepers will wear a blue arm band and the pilots a yellow arm band.

GENERAL PROVISIONS.

When two vehicles traveling in the same direction and at different speeds get into proximity to each other, the one traveling at the slowest pace will take the right of the road, at the first request, in such manner as to leave at least one-half of the road free. The driver of this vehicle must not attempt any manœuvres to prevent his competitor from passing him, and this under penalty of disqualification.

The vehicles must not be pushed except by their occupants. Exception to this rule is made in the two following cases: First, in leaving the parks; second, in getting out of bad places not inherent to the natural difficulties of the itinerary, such as ditches, trenches, etc. It is absolutely prohibited to direct the exhaust toward the ground, on account of the dust stirred up thereby, and because it prevents one contestant from passing another. Compliance with this rule will be ascertained at the same time the parts are stamped.

All civil and penal responsibilities rest upon the contestants, upon whom they are incumbent. The drivers must be provided with the documents required by the authorities of the countries traversed. The commission will do its utmost to secure for them every facility in this respect, and will inform them at a later date of the special arrangements which it has been able to secure.

A copy of the present rules will be furnished to each of the contestants, who will be required to receipt for same. The contestants in signing the entry agree to conform to the present regulations and to the decisions of the commission.

REPAIR WAGONS.

Repair wagons (voitures de secours), occupied by employees or by tourists, are strictly prohibited. The control keepers are instructed to notify the Sport Commission, which, if the case requires, will disqualify the firm for the vehicles of which the repairs were intended, as well as the persons aboard these repair wagons.

TRIAL RUNS OVER THE ROUTE.

Every automobile driver who operates a machine on the route of the race, before the actual date, at a speed above that permitted by law, will be disqualified on this account from participating in the race, and will have no right to demand the return of his entry fee. The Sport Commission may extend this disqualification to all vehicles of the firm for whose account the driver made the trip. Correspondents will be appointed along the route of the race to at once report all infractions of the rule.

PROTESTS.

All protests must be made in writing and be in the hands of one of the general commissioners of the race within four days from the arrival of the first vehicle at Madrid, in order to be examined by the commission, from the decision of which there is no appeal. Every protest to receive consideration must be accompanied by a sum of 100 francs, which will be returned to the protestant if his protest is found justified.

GENERAL COMMISSIONERS.

Each of the two clubs will designate three general commissioners. It will be the duty of these commissioners to insure the regularity of the race, and it will be their special duty to supervise the start in each stage, the arrival in each stage, and the entry into and departure from the parks in each stage. They should meet before the race and be fully agreed on all matters of detail, in order that there may be a true unity of management during the contests. The general commissioners have full authority over all local commissioners, control keepers and special road police, wherever they may be. The general commissioners of the race are: For France, Prince P. d'Arenberg, H. Huet, Count de Vogüe; for Spain, Duke d'Arion, L. de Errazu and Quinones de Léon.

EXHIBITION.

Every vehicle arriving at Madrid will be required, under penalty of disqualification, to participate for two days in the exhibition organized under the auspices of the Royal Automobile Club of Spain.

In the improbable case where, for any reason, the distance from Paris to the Spanish frontier cannot be traversed at racing speed, this contest will take place between the Spanish frontier and Madrid, and the entry fees will remain acquired by the racing fund.

Calendar of Automobile Dates and Events.

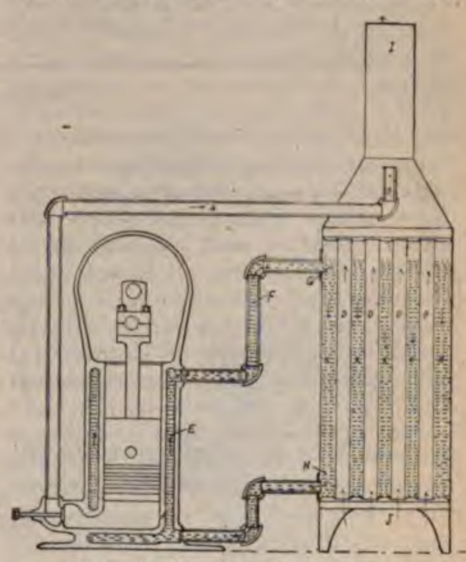
March 9—14.—Buffalo Show at City Convention Hall.
March 16—21.—Boston Show, Symphony Hall.
March 18.—Special meeting of N. A. A. M.
March 23—28.—Washington Show, Light Infantry Armory.
March 21—28.—London Show at Agricultural Hall.
May.—Contest of commercial vehicles under auspices of A. C. A.
May 24—26.—Paris-Madrid race.
July 9.—Gordon Bennett cup race.

On March 10 the Smith & Martensen Company, New York, removed to their new quarters at 146 and 148 West Thirty-ninth street, where they occupy the entire building, with a floor space of 4,500 square feet. They handle the Automotor, Knox, Whitney and Kensington automobiles, and conduct a general automobile storage and repair business.

NEW VEHICLES AND PARTS.

The Hart-Parr Oil Cooling System.

The cut below illustrates the oil cooling system used by the Hart-Parr Company, of Charles City, Ia., and referred to in a recent issue. The system is employed on a traction engine and seems suitable also for other commercial vehicles, such as trucks. The engine is arranged in an inverted manner, the same as many small stationary engines. The jacket E of the engine is in direct communication on top and below with a tank in the form of an upright tubular boiler, a large number of tubes D D D passing up through it. The oil flows from the top of the jacket through the pipe F to the top of the tank, which it enters at G, and returns to the jacket through the lower connection pipe, which it enters at H. The exhaust from the engine is led through the pipe A into the dome above the oil tank and is discharged through the nozzle B into a stack surmounting the tank. The suction created by the upward discharge



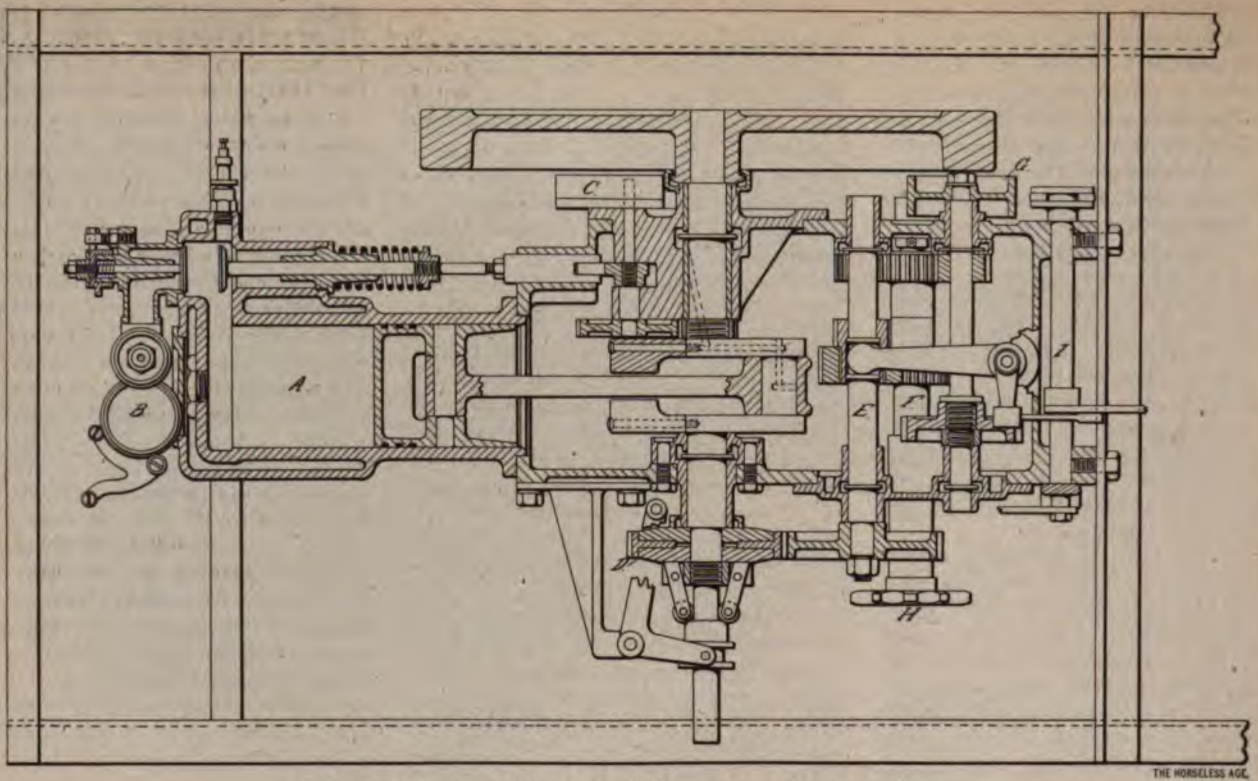
H. & P. Oil Cooling System.

of the exhaust into the stack causes a strong upward draught of air through the tubes D D D, thus facilitating the radiation of heat. One advantage of using oil for this purpose is that it will not freeze in cold weather, and we presume that there is no evaporation, and consequently no need of replenishing the cooling medium.

The "St. Louis" Power Equipment.

The accompanying cuts represent a sectional plan view and an elevation of the motor and transmission gear of the 8 horse power tonneau car recently brought out by the St. Louis Motor Carriage Company. A peculiarity of this construction is that the motor and gear are built into one large, substantial case, which offers the best guarantee of the bearings remaining in line with each other.

The motor is a single cylinder, horizontal one of 5¼ inches bore and 6 inches stroke,



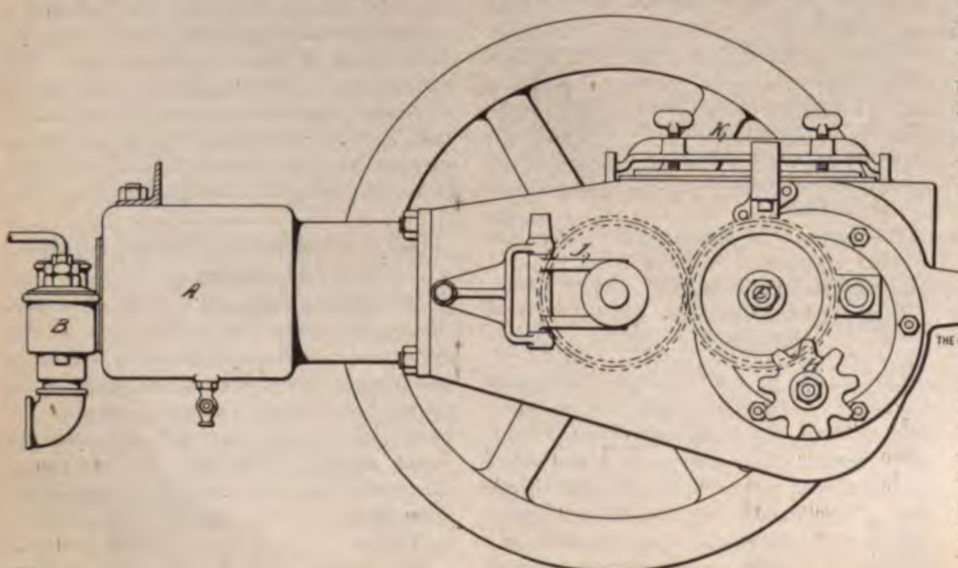
SECTIONAL PLAN OF "ST. LOUIS" ENGINE AND CHANGE GEAR.

running at 800 revolutions per minute normal speed. Inlet and exhaust valves are arranged in line with each other at the side of the cylinder, and the valve chamber and cylinder head are cast integral with the cylinder, thus avoiding all packed joints. The crank is provided with balance weights and the gears for driving the cam shaft are located in the crank case. The engine has exceptionally long bronze bushed bearings with ring oilers. On the flywheel side the bearing is provided with a cap which retains the oil working out of the bearing and permits it to return to the oil well. The bearing at the opposite side is also surrounded at its outer end by a cap which catches the oil flowing out of the bearing and allows it to flow into the friction clutch. The cam shaft is driven through spur gears, and the exhaust cam push rod is provided with a cam roller. The flywheel is 24 inches in diameter, with a rim of about 2x2½ inches.

The engine has jump spark ignition and thermo-siphon circulation of the cooling water. The water which is heated in the water jacket of the cylinder rises through a tube into the tank located under the bonnet in front, where it is cooled by the air that comes through the apertures in the bonnet. Its place in the water jacket is taken by cold water which flows down to the cylinder from the flanged radiator, which is hung under the bonnet, and into which the water from the tank settles as it cools. The carburetor, of the constant level type, is located just back of the cylinder head. The speed of the engine is contr by means of a device acting on the i valve. Ordinarily the engine is thr down, and by depressing a pedal wit foot the intake valve can be given fu and the engine speeded up.

The friction clutch is placed on th gine shaft and is of the familiar disk operated by a sliding cone and clutch The loose member of the friction c forms a spur gear which meshes wit other spur gear of equal size on the on which the sliding pinions are mo The gears are operated by a single which on being moved forward one extreme position to the gives first the slow forward, then the forward and finally the reverse motio second hand lever controls the clutc brake. The power is transmitted t rear axle by means of a single chain. gear shafts are also lubricated by ring and the gears themselves by means of s in the case. The crank and gear c covered by a door on top, held in pla means of a yoke and clamping bolts. permits ready access to the v ing parts. The method of porting the power equipme the vehicle frame is plainly s in the drawings.

Following is a key to th erence letters in the two ings: A, engine cylinder; B, carburet circuit breaker; D, friction clutch; F, transmission shafts; G, brake dru sprocket pinion; I, brake lever sha clutch fork; K, yoke for holding d gear case in place.



ELEVATION OF "ST. LOUIS" ENGINE AND CHANGE GEAR.

Sterling and Rock Falls, Ill., will be nected with a line of automobiles.

The Jones-Corbin Gasoline Car.

The Jones-Corbin Company, of 1432 North Sixth street, Philadelphia, are manufacturing a medium weight single seated gasoline car, of which an illustration is shown herewith. The car is propelled by an 8 horse power single cylinder De Dion motor, which drives through a conical friction clutch and clash change gears, the latter giving three speeds ahead and one reverse. The gears run in a case filled with grease and the shaft bearings are lubricated with oil; they are provided with a felt washer at the end of the box to prevent any grit from getting into the bearings. An interlocking system of novel design is used, which prevents the gears being shifted in mesh while the clutch is in. The drive to the rear wheels is by double chains. Both the countershaft and axles are mounted on roller bearings, and anti-friction bearings are used throughout. Lubication is automatic, from an oil reservoir attached to the dashboard. For cooling the circulating water a Whitlock radiator is used and circulation is effected by means of a friction driven pump.

The vehicle runs on 28 inch wood wheels fitted with 3 inch pneumatic tires. The body is of wood and may be provided with different forms of seats. The steering is by an inclined hand wheel, which can be moved out of the way when getting into the seat. The frame of the vehicle is constructed of sheet steel stampings. The wheel base is 6 feet 6 inches. The vehicle is claimed to be capable of a maximum speed of 35 miles per hour. The weight of the car is 700 pounds and the seating capacity two persons.

JONES-CORBIN GASOLINE CAR.

Motor and Gear Manufacturing Company's Parts.

The Motor and Gear Manufacturing Company, of 136 Liberty street, New York, have during the last two months developed a gasoline touring car chassis, with a French model double cylinder motor and a Panhard type sliding gear transmission. They inform us that they have been considerably delayed in making their final machine shop arrangements, and will therefore be unable to market the complete chassis the present year. In consequence they have decided to place upon the market castings and working drawings, and have issued a catalogue describing the various parts making up the chassis. They have a complete Mors type of chassis, with motor and transmission gear mounted in position, on view at their office, where same may be inspected by interested parties. Walter L. Bodman, who has an extended European experience in the automobile business, has recently assumed the management of this company and may be consulted at the company's office.

COMMUNICATIONS.

Spark Gap in Series.

Editor HORSELESS AGE:

Referring to your article "Spark Gaps in Series in Jump Spark Ignition," your query, "Would it not be advisable in the case of two cylinder engines to connect the two plugs in series?" deserves some remarks. I think it would not be advisable, first, because there is no assurance that both plugs will not become fouled at the same time, thus lessening the resistance in the secondary circuit, which an external gap maintains. In such a case the tension would not be built up to near its maximum before a discharge took place, which is the object sought to attain by the external gap. Secondly, the external gap must have such a resistance that the pressure rises to near its maximum point before the discharge occurs; that is to say, it is not sufficient to have a gap of one-sixteenth, one-eighth or one-quarter inch, but it is my opinion that to be effective the external gap must be adjusted while the motor is running with a foul plug. I have witnessed experiments in which this gap was nearly three-eighths of an inch, and any reduction of this gap would cause faulty ignition, the same as an increase of the gap toward the limit at which the pressure was insufficient to bridge it.

I also wish to come to the support of C. E. Duryea's remarks on gasoline motor data. Mr. Perkins' article by no means proves that it is wrong to take cylinder dimensions and rotative speed as a basis for the comparison of horse power. I think it wrong to apply the usual formula for approximating the actual horse power, but think that if Frederick Grover's formula is used for determining the mean effective pressure and from this the indicated horse power is calculated, a very fair comparison is obtained, and I know of nothing better outside of an actual demonstration. Mr. Grover's formula supposes the ratio of the volume of cylinder to the volume of the compression space to be known, and it is perhaps a little harder to obtain the volumes of the cylinder and compression space than to simply get the bore and stroke.

C. M. MOHLER.

Steam Engine Queries.

Editor HORSELESS AGE:

I wish to build a small triple cylinder compound engine which is to work with an initial pressure of 200 pounds to the square inch and to give eight expansions, with a cut-off at half stroke. I have selected for the high pressure cylinder an area of 3 square inches, and for the two low pressure cylinders an area of 6 square inches each. Will these sizes give the best economical results? If not, will you kindly give the formula for best proportions in your next issue?

J. THOMPSON.

[In compound automobile engines the low pressure cylinder is usually made of about double the diameter or with four times the area as the high pressure cylinder, this corresponding with the dimensions you give. We have never heard of such small compound engines being made with double low pressure cylinders, and should think that there would be a considerable loss of economy as compared with a single low pressure cylinder, since the combined area of walls of the two cylinders is so much larger than the area of walls of a single cylinder equivalent in size.—ED.]

Defective Insulation Ignites Gasoline Overflowing from Carburetor.

Editor HORSELESS AGE:

Soon after the first of the year I wrote you regarding an experience I had just had with the gasoline machine which I own. It is a well known machine, with a two cylinder opposed type of engine, and one which has an electrical apparatus so arranged that both cylinders are sparked at the same time by a jump spark, one with an explosive charge and the other on the exhaust stroke.

I recounted in my former communication how, in attempting to start the engine in cold weather, I poured hot water on the carburetor, and in turning the engine over it failed to start, but found that the back carburetor was on fire. The carburetor float had stuck previous to this, so that some of the gasoline had run over on the floor. At that time I suggested that the cause of the accident was the pouring of water on the carburetor and that some of the water had splashed over on the insulation of the high tension wire.

The same accident occurred yesterday when starting the machine, and I found that the float had stuck and the gasoline

had run over from the carburetor; it was the back carburetor in both instances. I had poured no water on the carburetor this time, so concluded that it must have been from some other cause, and upon examination I found that the insulation around the high tension wire had been broken at a point where it turned a corner to go to the spark plug. The current had apparently jumped over an intervening space of an inch or more to the carburetor, setting fire to the gasoline. This was corrected by winding the insulation with insulating tape, after which it worked properly. This is the only instance to which I have had my attention called where the jump spark had fired the gasoline outside of the carburetor.

WILL W. MORRISON.

Queries.

BROKEN BOW, Neb., March 3.

Editor HORSELESS AGE:

I am the owner of a steam carriage fitted with a coal oil burner. What precaution can I take to prevent the generator and other parts from getting filled up with carbon, and how can I clean it? Why don't the manufacturers go after the railroads for charging such high freight rates on automobiles and parts? W. R. P.

[In kerosene burners the kerosene gas is usually passed through a wire gauze plug which retains solid carbon particles and is placed so it can be easily removed and cleaned or replaced. How a vaporizer can be cleaned depends entirely upon its construction, and you ought to get the most precise information on this point from the manufacturer. One reason the manufacturers don't "go after" the railroads for charging excessive freight rates is undoubtedly that they don't have to pay the freight. We believe, though, the Manufacturers' Association has the matter of freight rates under advisement.—ED.]

"Motor Vehicles for Commercial Purposes—Their Advantages and Disadvantages."

The above was the subject of discussion at the meeting of the Automobile Club of America on Tuesday evening, March 3. President A. R. Shattuck presided and called upon E. T. Birdsall to open the discussion. Mr. Birdsall said that there was no doubt that eventually the motor vehicle would prove a success for commercial transportation, and he referred to a number of users of motor deliveries who, with proper care, obtained very satisfactory service. About two years ago he had had some experience with a steam truck and had reached the conclusion that for this latitude steam is not a very suitable power, as the piping is too liable to freeze up. He remembered very distinctly how he spent one night in January at the middle of the Brooklyn Bridge with the steam truck frozen up. To obtain satisfactory service careful supervision of the vehicles would be necessary and the proper class of drivers must be employed. A big department store, for instance, could easily keep a good man to look after the machines and see that they were always kept in order, and under such conditions the motor delivery wagon should prove a success. He now favored gasoline as the motive power, and thought that a gasoline power equipment for a delivery wagon should be designed simpler than the power equipment of pleasure carriages. There should be fewer adjustments, and it would probably be found an advantage to use a constant speed engine and entirely rely on the change gear for varying the speed. The whole problem of commercial transportation work by motor vehicles had as yet received very little attention—"the surface had hardly yet been scratched."

The next speaker was Henry C. Cryder, who advanced the idea that the chief advantage of the motor vehicle for commercial purposes consisted in the improvement it would bring about in the conditions of traffic in New York city. He referred to the congested condition of the streets of the city between Fourteenth and Fiftieth streets. Motor vehicles, he said, could wind in and out among other vehicles, run faster and occupy less space, and these various conditions would combine in greatly relieving the present congestion. The noise of traffic would be greatly reduced and the expense of stabling, which is a very large item in a city like New York, would be materially cut down. The gasoline motor was his favorite for this work, and he thought that the vehicle should be equipped with a motor giving plenty of power for a maximum speed of 9 miles an hour and permit of easily climbing any grade that might be met. Trips of 50 miles a day is what most of the stores require, and the vehicle should be capable of easily covering this distance.

H. Ward Leonard said that his ideas regarding commercial motor vehicles were radical and different from those of most others. He considered the chief field for commercial motor wagons to be that of heavy duty—that is, the carriage of loads upward of 5 tons. He believed in the gasoline motor as the most efficient source of power, but thought that in this line of work difficulties would be met with the transmission gear, as such enormous strains have to be borne. The strains are particularly severe in starting, when the whole mass of the vehicle and load has to be accelerated. He believed that electric transmission would be found the most suitable, and referred to a system on which he had taken out patents. This system comprises means for starting an electric motor by gradually increasing the electromotive force of the source of the current. On an automobile the gasoline engine would be driving a dynamo direct and the latter be electrically connected to motors hung from the rear axle and geared direct to the driving wheels. When the vehicle is at a standstill, the field of the dynamo would be reduced in strength so as to be ve[...] and practically no electromotiv[...] would be generated. If it is de[...] start the vehicle the field of the g[...] would be strengthened gradually [...] ting out resistance, and the electr[...] force of the generator would gradu[...] crease at the same time, until it w[...] cient to cause the motors to start t[...] cle. Among the advantages of this [...] were an entire absence of shocks a[...] imum simplicity of controlling [...] only a single lever being required, f[...] ing the field strength of the generat[...] system had been used very satisfac[...] connection with the moving side[...] the Paris Exposition and was also [...] moving turrets on battle ships.

The next speaker was the repres[...] of a New York dry goods firm, w[...] that they had in use a number o[...] electric trucks which they bought f[...] each. These trucks were maintaine[...] manufacturers at an annual cost o[...] cent. of the first cost. They found [...] ticular advantage in these wagons, [...] work was not such in which the high[...] of motor trucks came into play, beca[...] mostly had to run a few blocks [...] tween stops. The trucks were sati[...] while they were running, but he wa[...] opinion that the manufacturers wer[...] money on their 10 per cent. main[...] guarantee, as this included the re[...] tires, batteries and all other parts [...] to wear. The wages of the drivers [...] trucks were the same as those [...] truck drivers.

E. B. Gallaher gave some data i[...] to a 3 ton Panhard truck which h[...] in operation under his observat[...] eighteen months. The vehicle was [...] a lot of ten which had been built [...] Panhard Company for the Frenc[...] It had a four cylinder 15 horse po[...] tor and weighed about 3,500 pounds[...] The wheels were shod with flat tre[...] rubber tires, 4½ inches wide at t[...] and about 2 inches high. The ge[...] four forward speeds and a reverse a[...] sisted of hardened steel pinions a[...] bronze wheels, the teeth remaining [...] constantly. The maximum speed [...] miles per hour. Some difficulty [...] times experienced in starting fro[...] particularly in bad places on the r[...] the clutch had to be manipulated [...] or the motor would stall. This tr[...] never been off the road a single [...] repairs and had covered an avera[...] miles per day. It had been operat[...] erally by unskilled labor and had [...] altogether very satisfactory. The [...] cost had been $2,600 and the cost o[...] tion about $120 a month, the latte[...] including the wages of the drive[...] gasoline (450 gallons at 10 cents pe[...] equals $45) and oil and waste ($15[...] repairs to the vehicle during th[...] period of eighteen months had [...] ceeded $200; the tires were in pr[...] the same condition as when the [...]

was received, and the depreciation of the machine as a whole was probably not over 10 per cent. The trucking expenses of the concern previous to putting the motor truck in service had been on an average $225 per month, and had been considerably reduced by the adoption of the motor truck.

Mr. Scott stated that some time ago, when he completed a vehicle of this kind, the regular tires ordered for the vehicle had not arrived, and as he was eager to test the machine he put on hemp rope instead, the ends of the rope being wired down to the felloe of the wheel. These ropes had now worn for three months and their durability seemed to indicate the possibility of obtaining a tire intermediate between the steel tire and the rubber tire, which would be less expensive than the rubber and give more adhesion than the steel tire. Another gentleman stated that a large New York brewery, after using an electric truck for six months, had been so well satisfied with its services that it decided to purchase eight more of them. The batteries of the first truck had been worn out after a year's use and required renewal, but the vehicle had proven satisfactory in every way. In conclusion Mr. Birdsall said that several years ago he collected some figures regarding the actual ton mile cost for horse transportation, and found that it varied between 14 and 16 cents. Some of the figures had been furnished by a large establishment, which had kept a separate account of its trucking expenses, and the figures covered a period of five years and related to the work of two horse trucks carrying 2 to 3 tons. This figure of cost per ton mile had been cut in half in the competitions of motor trucks in England.

The Philadelphia Show.

The show held in the Horticultural Hall in Philadelphia last week was fairly successful for a local show. The show hall is not particularly roomy and practically all the space was taken, but nearly all the exhibits were by Philadelphia agents and no new vehicles were shown. The attendance was good throughout the week, particularly during the evenings, and the sales effected are said to have been quite satisfactory. As at other shows, quite a number of vehicles were kept in the street for demonstration purposes. A list of exhibitors was given in our last issue. Some of the exhibitors were rather tardy and a number of the stands were empty during the first few days. The Automobile Club of Philadelphia had charge of the social end of the affair and arranged a number of functions during the week. The building contains two halls, and both were devoted to exhibition purposes, the spaces in the upper hall being devoted to parts and sundries. There is already talk of repeating the exhibition next year.

...OUR... FOREIGN EXCHANGES

Tests on Banki Motors.

A number of tests made by Professor Schimanek on the improved internal combustion motors designed by Donat Banki, of Budapest, are reported in a recent issue of *Zeitschrift des Vereins Deutscher Ingenieure.*

To permit the use of high compression without the danger of premature ignition Herr Banki injects into the charge of combustible mixture a spray of water, finely atomized, which mingles with the charge as it is drawn into the cylinder. The presence of moisture raises the temperature of ignition very materially, so as to avoid the danger of premature explosion. The moisture is expanded by the heat produced by the explosion, and its expansive power is added to that of the charge, thus returning as mechanical power the heat it absorbs, and the thermal efficiency is unaffected by the presence of water.

Professor Schimanek examines the thermal conditions dependent upon the use of different percentages of moisture, for a compression of the charge to one-tenth of its initial volume, and shows that for constant specific heat the temperature of the charge without the water would be 1,030° C., giving a theoretical thermal efficiency of 61 per cent., while with a ratio of 0.08 of moisture to air, by weight, the temperature of compression is lowered by 530° C., and the theoretical thermal efficiency still remains as high as 58.4 per cent.

Professor Schimanek describes in detail tests upon Banki motors using as fuel benzine, alcohol and gas. Indicator diagrams show a compression pressure of 12 to 15 atmospheres and explosion pressures of 35 to 40 atmospheres, while the thermal efficiency per brake horse power is as high as 31 per cent.

The improvements in the present motors over those of earlier design are mainly in mechanical construction and in the apparatus for spraying the water into the entering charge, the principle of the machine being practically the same as that originally shown at the Paris Exposition of 1900. The present engines, however, are of small power, ranging from 3 to 10 horse power, which renders the big thermal efficiency the more notable.

An interesting phase of the experiments described by Professor Schimanek appears in the adaptation of the principle to the motor of an automobile. A gasoline vehicle of the well known De Dion-Bouton construction was taken and the cylinder head of the engine removed and replaced by another constructed so as to increase the compression from 1 : 3.6 to 1 : 5.81, and a device for spraying water into the charge was attached. Brake tests of the motor showed an increase in capacity of about 30 per cent., while the cooling effect of the water was very marked. It is probable that this principle may therefore prove of value in connection with motors of vehicles as well as for stationary service.

The De Dion motor experimented with was an air cooled one of 66 millimetres (2.64 inches) bore and 69 millimetres (2.76 inches) stroke. It was so altered that when the crank was in the inner dead centre the piston head was only 2 millimetres from the cylinder head. Without the injection of water the motor would not run with this alteration. The ratio of compression before the change was made was 3.6 : 1 and after the change 5.81 : 1, the ratio for regular large size Banki motors being 10 : 1. Originally the motor developed 1.2 horse power, and, after being changed as described, 1.57 horse power, both at 1,500 revolutions per minute. The same proportional increase in power was observed at higher speeds. The consumption of water was equal to about one-half the consumption of gasoline. The electric ignition operated as regularly as usual.

The Paris-Madrid Race.

The start for the "Paris-Madrid" race will take place in the small hours of Sunday morning, May 24, and according to the list of entries up to date no fewer than 232 cars and motor cycles will present themselves for this contest. The first stage will be the classic route from Paris to Bordeaux—straight and even, without serious hills. The distance is 362½ miles, and was covered in 1895 in about 24 hours, in 1898 in 15 hours, in 1899 in 11 hours 43 minutes and in 1901 in 6 hours 11 minutes, the present record. Presuming it is reduced to well under six hours by machines many of which are claimed to do 80 miles an hour on the level, some of the racers will be starting from Paris two hours after the leader arrives at Bordeaux.

But after Bordeaux it will be quite another story. First there will be the Pyrenees to cross, with some steep stretches and frightful turns. The journey on to Madrid is divided into two more stages in two days. The roads cannot, of course, compare in quality with those of France, but they are not so bad as some of the Swiss and Austrian roads traversed in the "Paris-Vienna" race. In straightness they leave little to be desired, there being some stretches of "dead straight" over 50 miles long. Toward Madrid, however, the condition is bad, and really high speeds will be impossible.

Both the French and Spanish Governments have authorized the race in their respective territories. The vehicles comprise ninety-five big cars, fifty-nine light cars, thirty-five voiturettes and thirty-six motor bicycles. Among the entrants are a considerable number of English and American automobilists, the former including Messrs. Edge, Mayhew, Holder, Hutton and Arnott, and the latter Messrs. Dinsmore, Keene, Harkness, Dannat and others.

An automobile fête of three days' duration will be held by the A. C. F. in Paris from June 18 to 20.

German manufacturers of alcohol motors have decided against exhibiting at St. Louis in 1904, "as America is in possession of immense sources of motor fuels much cheaper than alcohol."

The King of England has joined the Automobile Club of Great Britain and Ireland. It has been decided to organize a woman's automobile club to co-operate with the parent body.

The Legislature of the Swiss Federation has promulgated the following definition of the term "automobile": All vehicles which are moved by elementary power through mechanical drive, but not on rail installations.

Another step is to be recorded in the progress of the automobile. The triumphal car of the queen of the Mi-Careme carnival in Paris will be a gaily decorated motor lorry, and it will be followed by half a dozen others.

In the fuel consumption trials organized by the publication of the A. C. F. there were fifty-six entries, forty starters and thirty-eight who completed the whole course. Among the prizes was a gold medal offered by the Minister of Agriculture to the first vehicle using alcohol.

To take care of the Spanish end of the Paris-Madrid race, says a dispatch, the Minister of Public Works of that country has granted $4,800. This money will be spent in improving the roads and in providing against accidents. Immediately following the finish of the race there will be held an automobile exhibition in the Palace Hippodrome.

Germany has just decided to devote $70,000 annually to the purchase and maintenance of military motor wagons. France recently restricted her appropriation for this purpose to $4,000 annually. The German War Minister is organizing a trial of heavy vehicles suitable for military transport purposes, which will take place toward the end of the year.

At the meetings of the London Road Car Company and the General Omnibus Company, held on February 17, the subject of motor omnibuses was mentioned in both reports. The Road Car Company stated that it had several types under consideration, and during the next few months several road cars, the vehicles themselves somewhat of the ordinary garden seat type, driven by mechanical power of different kinds, would be put on the streets. At the General Omnibus Company's meeting the chairman announced "it now seemed as though there was a reasonable possibility of a practical motor omnibus being produced, but before going into any heavy expenditure they intended in a practical manner to study the cost of repair, maintenance and depreciation."

In a recent French 100 kilometre fuel consumption trial a 12 horse power Peugeot truck made the best record, .0489 litres of gasoline per "tonne kilometrique," which is equal to 53.16 ton-miles per gallon. Alcohol showed satisfactory results, seventh place in the general classification being secured by a 6 horse power Peugeot, consuming 10 pints and giving a result of .0636 of a litre to the tonne kilometrique.

A meeting of the British automobile trade was held at the Hotel Cecil, London, on Thursday, February 19, Frederick Simms, president of the Society of Motor Manufacturers and Traders, in the chair. Mr. Simms spoke upon the importance of having one great annual show. After some discussion it was decided to hold the society's official exhibition for 1904 from Friday, February 18, to Wednesday, February 24, in that year, both days inclusive.

The steady advance in the use of motor cars in London has had a very damaging effect upon the carriage industry. Perhaps the effect of the change to the horseless vehicle has been most felt by those who desire to dispose of carriages and traps. Some of the places where this class of business is carried on have nearly all their available space occupied, and unfortunate sellers find they are compelled to accept prices which would have been regarded as quite absurd a few years ago.—*The Scotsman.*

Why must a driver of an automobile look like a mountain goat in order to keep in the fashion? The other day the proud owner of a 20 horse power Mercedes stood on the pavement in front of a Pall Mall club, struggling into the depths of a huge hair covered coat. A costermonger who witnessed the operation stopped and regarded him with tender interest. "'Ullo, matey," he said admiringly, "hit's lovely. Cut us off a pup!" Similarly a street urchin, after wandering around a shaggy motorist in Regent street in a vain effort to discover "which end bites," came to a baffled halt and exclaimed, "Bow-wow, Fido—shake yourself."—*Express.*

The *Autocar* in a recent issue publishes some figures on the Crystal Palace exhibits. There were shown 273 light and heavy motor cars, 118 voiturettes, 40 covered carriages, 24 vans and lorries, 11 omnibuses and 68 chasses, making a grand total of 534, compared to 556 at the Paris Show of 1901. There were 189 catalogue exhibitors, of whom 115 were exhibitors of cars and 111 of motor cycles. The cars included 438 (82 per cent.) driven by gasoline [mo]tors, 33 (11.8 per cent.) driven by ele[ctric] motors, and 63 (19.2 per cent.) drive[n by] steam engines. Fifty-five per cent. o[f the] vehicles had chain drive to rear axl[e, ..] per cent. Cardan shaft drive and nea[rly ..] per cent. belt drive. Only two vehic[les ..] American electric—were shown fitted [with] solid rubber tires.

M. Lepine, prefect of police of [Paris,] was waited on by a delegation of aut[omo]bilists on February 20, who considered [they] had a grievance against the police. [The] prefect ordered an inquiry on the spot [and] not only admitted that the deputation [had] reason to feel aggrieved, but declared [in the] most categorical fashion that he was fr[iend]ly to automobilists. He considered[, he] said, that the regulation limiting the [speed] of motor cars in the Bois de Boulogne [to ..] miles an hour was antiquated, and h[e de]clared that the police had formal ins[truc]tions not to interfere unless the speed [was] dangerous. In deserted places where [there] was next to no traffic he allowed [any] speed, provided there was no chance o[f ac]cident, and he added that he did not [think] it necessary to destroy the legend tha[t the] police were allowed a premium on [each] summons they drew up.

The Gordon Bennett Cup Race

Subjoined is the text of the bill i[ntro]duced by the Hon. John Scott-Mon[tagu] at the instance of the Automobile Clu[b to] authorize the holding of the Gordon [Ben]nett motor car race in Ireland this ye[ar.]

Be it enacted, etc.:

1.—(1) The council of any administ[rative] county may, on the application of any [per]sons or club, by order declare that [any] roads within the county may be use[d for] races with light locomotives during [the] whole or part of any days specified i[n the] order, not exceeding three days in [any] year.

(2) The order may contain such p[rovi]sions as the county council may thi[nk fit] for the temporary suspension and re[stric]tion of other traffic for the safety o[f the] public, for the restriction of speed in p[opu]lous places, and for other purposes [inci]dent to the proper conduct of such ra[ces.]

(3) Public notice shall be given o[f the] provisions of the order by placards o[n the] roads so authorized to be used.

(4) No provisions of any act, by-la[w or] regulation restricting the speed of loc[omo]tives or imposing any penalty for fu[rious] driving shall apply to any light locom[otive] or the driver thereof, engaged in [such] races, save so far as the same may b[e in]corporated with the order.

2.—The expenses incurred by a c[ounty] council in carrying any order unde[r this] act into effect shall be defrayed by th[e ap]plicants, and the county council ma[y be]fore granting the order require the [appli]cants to make such deposit as may in

opinion be necessary to defray such expenses.

3—In this act the expression "light locomotives" shall have the same meaning as in the Locomotives on Highways Act, 1896, and all other expressions shall have the same meaning as in the Local Government (Ireland) Act, 1898.

4—(1) This act shall extend to Ireland only, and may be cited as the Light Locomotives (Ireland) Act, 1903.

(2) This act shall only remain in force until the 31st day of December, 1903.

New Incorporations.

The Speed Indicator Company, Jersey City, N. J., to manufacture automobile appliances. The capital stock is $100,000.

The Morlock Automobile Manufacturing Company, Buffalo, N. Y. Capital, $50,000. Incorporators, J. F. Morlock, H. J. Wagner and J. L. McGrane, all of Buffalo.

Drisko, Snow & Ross, Boston, to carry on an automobile business. They have the New England agency for the American runabout and Reber touring car, and are located at 43 Columbus avenue.

The Hartford Motor Vehicle Company, Hartford, Conn., to make motor vehicles of all descriptions; capital, $50,000; incorporators, Albion R. Wilson, Lucius F. Robinson and Frank A. Hagarty, all of Hartford.

The Rogers & Thacher Automobile Company, Augusta, Me., to make automobiles, motor wagons, etc. Capital, $150,000. The officers are: President, F. L. Dutton, and treasurer, M. B. S. Stuart, both of Augusta.

The Pope Manufacturing Company, Jersey City, N. J., to manufacture automobiles and other motor vehicles. The capital stock is $22,500 and the incorporators are Mountfort Mills, George R. Hargrave and Dunlevy Milbank.

The Philadelphia Automobile Company, under the laws of New Jersey, to manufacture automobiles. Capital, $50,000. Incorporators, Edward E. Ziegler, Edwin L. Hoffman, Thomas J. Mahoney, Robert H. Pflugfelde and William Vees.

Cleaver Motor and Vehicle Company, Milwaukee, Wis.—To manufacture automobiles; capital, $20,000. F. C. Cleaver is president; T. H. O'Brien, vice president; G. W. Watson, secretary; G. A. Knapp, treasurer, and J. A. Chapman, superintendent.

The Springfield Automobile Company, Springfield, Ohio, has been incorporated with a capital stock of $10,000. The officers are: President, Frank Howell; vice-president: C. C. Braunwell; secretary, Orrin Parsons; treasurer, Allen McGregor, and general manager, C. C. Braunwell. Others interested are Roy McGregor, F. M. Wilson and W. W. Keifer. The company will build the invention of Mr. Braunwell, of Boston.

MINOR MENTION

Clyde Crimmell and Paul Hailman, Hartford, Ind., are building a gasoline automobile.

Henry B. Joy, Detroit, Mich., uses very high grade lubricating oil for the circulating system in his Packard automobile.

C. G. Norton, Milwaukee, Wis., and C. W. Roe, Buffalo, N. Y., have been appointed agents for the Packard automobile.

The Jones-Corbin Company, Philadelphia, removed on March 4 into their new factory at 1432 and 1434 North Sixth street.

It is said that a company to be organized with a capital of $1,000,000 to manufacture automobiles is looking for a site for a factory at Geneva, N. Y.

It is reported that a large automobile station will be erected at 250 and 252 West Twenty-third street, New York, running through to 261 to 265 West Twenty-second street.

E. J. Willis, New York, has opened a branch store at 1172 Fifth avenue, where he has a building 25x100 feet, which will be used for the storge and sale of automobile supplies.

Charles F. Webber, of 16 St. James avenue, Boston, informs us that he has discovered a practical, inexpensive means of overcoming the odor of gasoline and hot oil arising from gasoline engines.

An association of chauffeurs and repair men is reported to have been formed in New York on March 3. Ralph H. Ogle is said to have been elected president, E. J. Barton vice president, and John J. Gauley secretary.

At the recent show of the New England Automobile Association, Mrs. A. S. Hitchcock, of Providence, R. I., performed many fancy "stunts" with her Oldsmobile, and is said to have been the only lady operator to give an exhibition at that time.

We are informed by Thorpe, Platt & Co., New York, who have the Thornycroft interests in the United States in charge, that they expect to make arrangements by which the Thornycroft gasoline cars, which were described in THE HORSELESS AGE of March 4, as well as their steam trucks, will be made and sold in America.

F. A. Lyman, of Geneva, Ohio, informs us that licenses have been taken out under the Lyman kerosene burner patents by the following: Cloud & Nichols, of Chiswick, London; Thomas Robert Atkinson, of Toronto, Ontario; the White Sewing Machine Company, of Cleveland, Ohio, and the Geneva Automobile and Manufacturing Company, of Geneva, Ohio.

The Toledo Motor Carriage Company, Toledo, Ohio, will erect a three story and basement brick automobile station on Madison street, between Tenth and Eleventh streets. The Toledo Automobile Club and the Electric Storage Battery Company, Philadelphia, will have quarters there.

The Hodges Vehicle Company, Pontiac, Mich., have added an automobile department to their business.

It is reported that a company is being formed to run a line of automobiles from the heart of Cincinnati, Ohio, to the suburbs and adjacent villages.

The Leisy Brewing Company, Cleveland, Ohio, have installed an electric delivery automobile, and if it proves successful they will purchase more.

The run of the Long Island Automobile Club, Brooklyn, N. Y., to Rockville Center, on March 1, was participated in by seven touring cars, carrying sixteen persons.

Bulletin No. 8 of the N. A. A. M. shows that the gross income of the association for the year ending December 31, 1902, was $5,827.26 and the expenses $4,250.65, leaving a surplus of $1,576.61.

Among the exhibitors at the Sportsmen's Show, New York, were the J. Stevens Arms and Tool Company, Chicopee Falls, Mass.; William Roche, New York, and the Goodson Electric Ignition Company, Providence, R. I.

John Maxwell, Oneida, embarked in the automobile business on March 1 as the agent of the Haynes-Apperson Company in thirty counties of New York State. He also has the local agency for the Century Motor Vehicle Company.

Alfred W. Norris, Saginaw, Mich., writes that he is now fully launched in the automobile business at 202 Genesee avenue, and that his line will include the Oldsmobile, General, Knox, Autocar, Packard, Columbia and Centaur machines.

W. E. Scarritt, president of the Automobile Club of New Jersey, and Albert J. Stowe, of Arlington, have written the Hudson County Board of Freeholders asking that the Bellevue turnpike be improved to connect the Hudson County boulevard with the good roads of Essex County. The matter was referred to the road committee.

The following have been elected members of the Florida Automobile Association, Jacksonville: J. H. Crosby, B. H. Chadwick, R. J. Riles, Dr. F. E. Buck, Bion Barnett, H. E. Clark, W. W. Frazier, W. S. Ware, Dr. R. E. Smith, Capt. C. E. Garner, Rutledge Holmes, Archie Hubbard, R. W. Adams, Charles S. Adams, R. W. Simms, J. B. Murello, J. D. Tipping, R. V. Covington, F. B. Cullens, C. P. Pennington, S. D. Graves, Arthur Perry, George W. Wilson and C. L. Meyer. J. B. Murello has been elected a State deputy to secure members and to urge the good roads question in all parts of the State.

German Show

An automobile show was opened in Berlin, Germany, on Saturday last with a parade before the German Emperor. This parade was participated in by a large number of vehicles.

Municipal Motor Wagons.*

The heavy motor wagon—a distinct type of vehicle intermediate as regards weight and power between the traction engine and the light motor car—has sprung up within the last few years. In spite of the apparently heavy first cost, the saving in working expenses as compared with the horse drawn vehicles it replaces is so pronounced that a short account of motor vehicles adapted for municipal service may be of interest. Even the first cost of a modern municipal steam vehicle, with dust van, water tank, sweeper, etc., compares very favorably with that of eight or ten horses, five dust carts, four water carts, and four horse sweeping machines, which it replaces. Again, the first cost of a steam wagon shed and yard must be much less than that of the stables and yard for the older plant.

One trailer may be drawn by each steam vehicle, under the Act of 1896. If a traction engine license be taken for the steam vehicle, more trailing vehicles may be used, the only practical limit to the number of trailers being determined by the power and adhesion of the motor vehicle.

GARBAGE COLLECTION.

Motor wagons have been supplied to many municipalities, the receptacle for the refuse being usually a separate body which can be easily attached to or detached from the under frame of the vehicle. Provision is made for tipping. The tipping body rests on transverse trunnions, its rear part projecting beyond the vehicle frame, while tipping is effected by raising its fore end by a screw, or other mechanical equivalent.

To secure the maximum economy in working motor tip wagons, the collection of refuse and the filling of the vehicle should be done as expeditiously as possible. The capacity of the motor tip wagon (7 cubic yards) being two to three times that of a horse drawn collecting cart, the number of laborers employed in filling should be greater. The speed of traveling being twice that of the horse drawn cart, the time spent in traveling to and from the destructor, or tipping place, is halved. The same staff of fillers may keep a number of tip wagons going, one being filled while the others are on their way to or from the destructor. The average distance between the destructor and the points of collection will determine the number of motor wagons for a complete refuse disposal plant. In any case, as large a staff of laborers as is found convenient should be concentrated on filling one motor wagon, so that the time the motor remains practically idle is a minimum. One motor dust cart has thus twice the speed and two and one-half times the capacity of a horse cart.

STREET SPRINKLING.

The morning collection of refuse being completed, the motor wagon runs into the yard, where a few minutes serve for the removal of the tipping body and the substitution of a water tank of at least twice the capacity of a horse water cart. At Hampstead it is found that the motor water cart replaces four horses and carts.

William Weaver, at Kensington, uses two water distributers in conjunction with the water tank—one for ordinary watering, the other for flooding the roads (wood paving) previous to sweeping.

A much greater duty than the above may reasonably be expected in the immediate future from motor water carts. The Thornycroft municipal steam vehicle (the one used at Hampstead and Kensington referred to above) has its motive parts the same as their standard 3 ton wagon, which has been so successful in general trade transport and in military service. In municipal work the vehicle would always be running on decently good roads, and the conditions are therefore not nearly so exacting as in ordinary trade or military work. The speed might, therefore, be increased in some cases, giving a greater length of road watered in a given time. The water distributer could be easily arranged to sprinkle the whole width of the road at one passage of the vehicle, suitable control valves being fitted. The water tank may be also used for flushing the gutters and street drains with disinfectant.

STREET SWEEPING.

An ordinary horse pattern rotary sweeper may be trailed behind the motor vehicle, as is done at Chelsea. At Kensington a special steam propelled street cleansing machine is in use. The Thornycroft standard steam wagon has been adapted to carry a water tank and rotary brush. The brush is driven from the driving axle of the steam wagon by means of chain and toothed gearing. The brush can be replaced by a spiral rubber squeegee. This machine can do 14,000 square yards per hour, and has been so satisfactory that another machine of the same general design has been ordered. It is said to replace eight horse sweepers.

To get the best performance from a municipal motor wagon, it should be a maid-of-all-work. It seems, therefore, that in many cases a trailing sweeper that can be quickly attached and detached may be preferable to a permanent motor sweeping machine that cannot be utilized for refuse collection and cartage.

With a powerful modern steam wagon capable of developing 25 to 30 horse power, driving the brushes, the latter may profitably be made wider than in horse drawn sweepers. A brush width of one-third the width of the average road would be ideal.

REMOVAL OF SNOW.

During the last few winters there has not been any great snowfall to be coped with by municipal authorities. When a heavy snowfall does occur, street traffic is disorganized, and the resultant loss to the business community is enormous. The use of the "unemployed" with brooms at 3d. per head per hour is at best a makeshift. The municipal steam vehicle, provide a suitable trailing scraper or front plow attachment, could deal effe and expeditiously with a snowfall c eral inches. The infrequency of heav of snow has up to the present render expedient any heavy capital outl preparations for its quick remova with powerful steam vehicles in dai for other purposes, the cost of a few plows or scrapers would be triflin would be more than repaid by the of loss of trade due to one heavy sn In the event of a heavy fall of sno ing the night all the motor vehicle snow removal attachments would at work in the early morning, a main streets would be ready for th traffic.

It would be necessary either to fi pipes to give the driving wheels a on the slippery road surface, or "snow shoes" to the driving whe is the practice of the Thornycroft Company for vehicles for trade tr in frosty weather.

In frosty weather rotary sand or sprinklers might be fitted to the du lecting bodies of the steam vehicles.

Cartage of road metal, paving building material, etc., may be don time to time as required. The dus or a special detachable lorry platfor be used for this purpose.

TYPES OF VEHICLES FOR MUNICIPAL

Up to the present steam holds t as the motive power for municipal the Thornycroft and Leyland vehicle both steam driven. Internal combus gines are the most successful type f swift passenger cars. They are us limited extent for heavy goods tra up to the present no municipal wag gasoline engines has been serious in practical work.

The steam engine and boiler cheaper fuel, coal or refuse oil, t internal combustion engine, the f being less than 1 penny per mile f hicle having a gross load of 6 ton compound steam engine, with cra connecting rod inside a closed oi ber, runs for months with no mor tion than that required for replenis oil in the crank chamber. A certa of power is obtained by shifting versing lever into different notche a further increase is got by admitt er steam direct to the low pressu der through a bypass. In this r compares favorably with the inter bustion engine, with the necessary cal ignition apparatus.

(To be continued.)

Wide tires are not only lighter draught than narrower ones, und ly all conditions, but they roll t smooth instead of cutting it to p 4 inch tire on a wagon carrying load is a road builder. This a steel tires.

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* Read by Archibald Sharp at the Conference of Engineers and Surveyors, Sanitary Institute Congress, Manchester.

LEGISLATIVE AND LEGAL.

The committee substitute for the Scovel automobile bill was passed by the New Jersey Legislature on March 4.

Gabrielle Coutain, Colgate Hoyt's chauffeur, was fined $25 at Mineola, N. Y., March 6, for violating the automobile speed law.

The hearing on the Massachusetts automobile speed bill, which had been set down for March 6, has been postponed until March 16.

M. F. Brabb, Romeo, Mich., has brought suit for $500 against Thomas G. Wagstaff, Detroit, for wrecking his automobile by running it into a hydrant.

The legislative committee of the York County Council have decided to petition the Ontario Legislature to regulate the speed of automobiles on the highways of the Province.

Harry Bradford, Boston, has brought suit for $5,000 against the State of Massachusetts for injuries sustained by himself, family and automobile on the highway at Cherry Valley recently.

A suit for $20,000 has been brought by S. M. Reynolds, Davenport, Ia., against John W. Buck, for personal injuries said to have been due to the automobile of defendant's son, Emil, in June, 1902.

Mrs. Kate E. Harrison, Bristol, Conn., has brought suit for $2,000 for injuries sustained on August 4, 1902, in a runaway alleged to have been caused by the automobile of Joseph Sessions.

Two suits have been brought against the Old Colony Railroad, one for $10,000 by John C. B. Woods, Providence, R. I., and one for $5,000 by Frank Innes, Mr. Woods' chauffeur, for injuries sustained in a collision last August.

David S. Brown, Jr., of the Desberon Motor Car Company, New York, was arrested on February 12, charged with speeding his automobile faster than 15 miles an hour. He was taken to the West One Hundredth street station, where he was bailed out by his father, D. S. Brown.

In the case of Frazer Brothers Company against the Eastern Automobile and Supply Company, in the Appellate Division of the Rhode Island Supreme Court, the defendant was defaulted. The case is one in which the plaintiff claims damages of $1,000 for the loss of a Baldwin automobile runabout, which they alleged defendants converted to their own use.

In the case of Herman Unger, of Newark, N. J., who was recently arrested in Fanwood for speeding his machine through that township, the defendant is contesting the ordinance governing the speeding of automobiles. The clause says that a man may be sentenced by a justice of the peace to not more than three months in jail or fined for its violation. His attorneys claim that the ordinance is unconstitutional, on the ground that it deprives a man of a trial by jury; that it is void because it was made on a law which also is void.

John W. Eisenhuth, president of the Eisenhuth Horseless Vehicle Company, New York, who was on trial last week in the Court of General Sessions on a charge of grand larceny in the first degree, made by James Wilson, of Bay Shore, L. I., of having obtained from him on fraudulent representations $3,000 for twenty-five shares of the stock of the company, when the stock, according to Wilson, was worth only $50 a share, has been acquitted. Counsel for Eisenhuth proved that while $50 was the par value of the stock, it had always been sold above par in the market.

A hearing on the ordinance regulating the rules of the road was given by the committee on laws and legislation of the Board of Aldermen, New York, on March 6. Among those present were A. R. Shattuck, W. W. Niles, counsel for the N. A. A. M., and Mr. Pumpelly, of the West End Improvement Association. The latter stated that the speed of 8 miles an hour in the city was satisfactory to the West End Improvement Association, but suggested that some sort of an amendment be made providing for hitching horses. Counsel for the Metropolitan Railroad suggested that the speed of automobiles be reduced to 3 miles when crossing car tracks. Short remarks were made by Mr. Shattuck, and at the request of Borough President Cantor the hearing was then adjourned until tomorrow, in order to give him and others more time in which to study the ordinance.

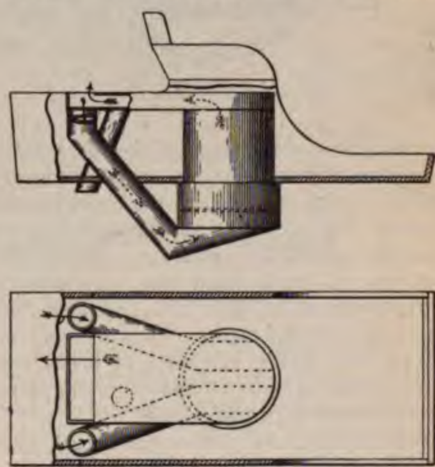
The Cincinnati, Ohio, automobile ordinance which was drawn up at the instance of the Cincinnati Automobile Club, was introduced at the March 2 meeting of the City Board of Legislation. It provides that an owner shall register with the city auditor and receive and pay $3 a year for a license; also a tag with numbers 4 inches tall to correspond with his license, which tag must be conspicuously attached to his machine and which will cost 50 cents per figure. The speed shall not exceed 7 miles an hour in that portion of the city bounded by Broadway and Water, Court and John streets, and 15 miles elsewhere. L. S. Colter, secretary of the club, writes about this ordinance as follows: "In view of the fact that the rather liberal rate of speed of 15 miles per hour is permitted in by far the larger part of the city, the automobile club members feel that they should not object to the very low speed of 7 miles per hour in the congested portion of the city bounded by the streets named, and which bound a distance of nine blocks north and south and nine blocks east and west. In this part of the city the street traffic is so heavy that users of automobiles would scarcely be able to make with safety better time than 7 miles an hour, even if permitted."

MOTOR VEHICLE PATENTS..

United States Patents.

721,195.—Draft Apparatus for Portable Vapor Generators.—Henry Howard, of Brookline, Mass. February 24, 1903. Filed January 2, 1902.

The "fires" in steam carriages are now more or less affected by the wind, particularly when the apparatus is being fired up preparatory to starting and when the vehicle is coasting, in which cases the draft is not assisted by the exhaust from the motor. Many differently shaped outlets and inlets have been tried to overcome this difficulty.



No. 721,195.

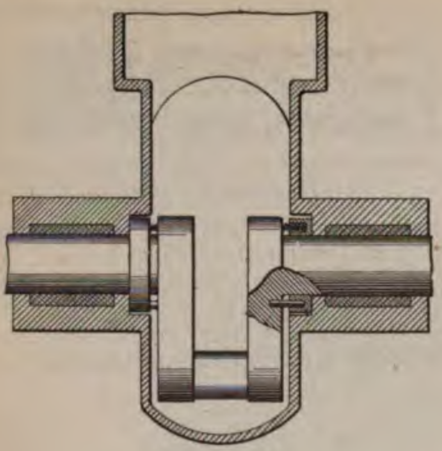
In the present invention the burner chamber is closed and fresh air is supplied thereto through one or more conduits or flues, the intake opening whereof is located in close proximity to the natural draft outlet for the products of combustion. Intake and outlet openings are thus subjected to substantially the same atmospheric pressure entirely independent of the velocity of the wind. By this construction and arrangement both intake and outlet for the burner chamber will experience in like degree whatever variation of atmospheric pressure may occur owing to changes in the direction and velocity of the wind. As a result the natural draft caused by the heat (and velocity of gases in most burners) is not at all affected, and a substantially uniform draft will be attained.

721,200. Speed Indicator.—Clarence E. Kelly, Anderson, Ind. February 24, 1903. Filed November 14, 1901.

721,269. Automobile.—Arthur W. Yale, Philadelphia, Pa. February 24, 1903. Filed July 9, 1902.

721,287. Packing for Engines.—L. S. Cushman and E. B. Cushman, of Lincoln, Neb. February 24, 1903. Filed November 13, 1902.

The invention relates to improvements in gas engines of the two cycle type, where-



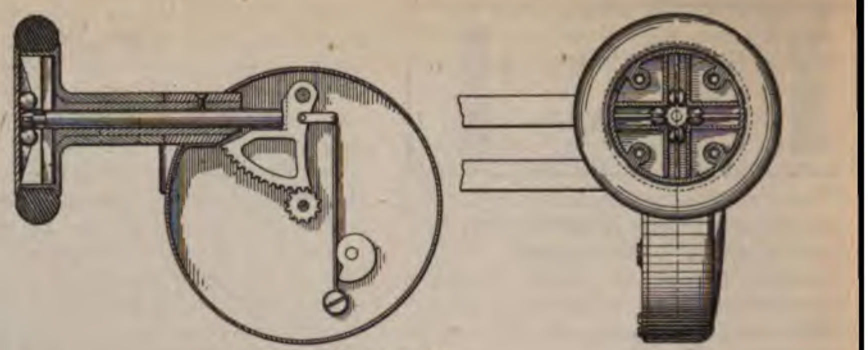
No. 721,287.

in the crank casing is employed as a compression chamber for the initial compression of air to mingle with the hydrocarbon vapor. The object of the invention is to provide means for guarding against the leakage of fluid from the compression chamber, and to this end comprises, in general, a spring pressed packing ring or rings held against the sides of the casing and extending around and revolving with the crank shaft of the engine.

The inner faces of the crank casing at the point where the crank shaft extends through the casing openings are finished, and against each bears a ring fitting snugly around the shaft and revolving therewith. The ring is pressed against the finished face of the casing by springs, which may take the form of small helical compression springs, bearing at one end against the crank and at the opposite end bearing against the bottom of a recess or opening formed in the ring for the reception of the spring. The springs may be of any desired number, and in practice it is preferred to employ three or more springs in order to evenly distribute the pressure. To insure the turning of the ring with the shaft, the ring is recessed for the reception of a pin projecting from the adjacent face of the crank.

721,284. Lubricator.—L. P. Caloin, of Dunkirk, France. February 24, 1903. Filed April 19, 1901.

The lubricator consists of a distributing vessel divided into two unequal compartments by a vertical position. These two compartments only communicate with each other by means of a tube, the diameter of which is small enough to prevent any sudden displacement of the oil from one compartment to the other. On the bottom of the larger compartment are screwed any preferred number of couplings, on which are mounted an equal number of pipes. Washers of leather form air tight joints. The pipes, open at the top and widened, receive wicks, the other ends of which are plunged in the compartment kept filled with oil at a constant level. These wicks act by capillary attraction to carry the oil from the oil compartment into the various pipes.



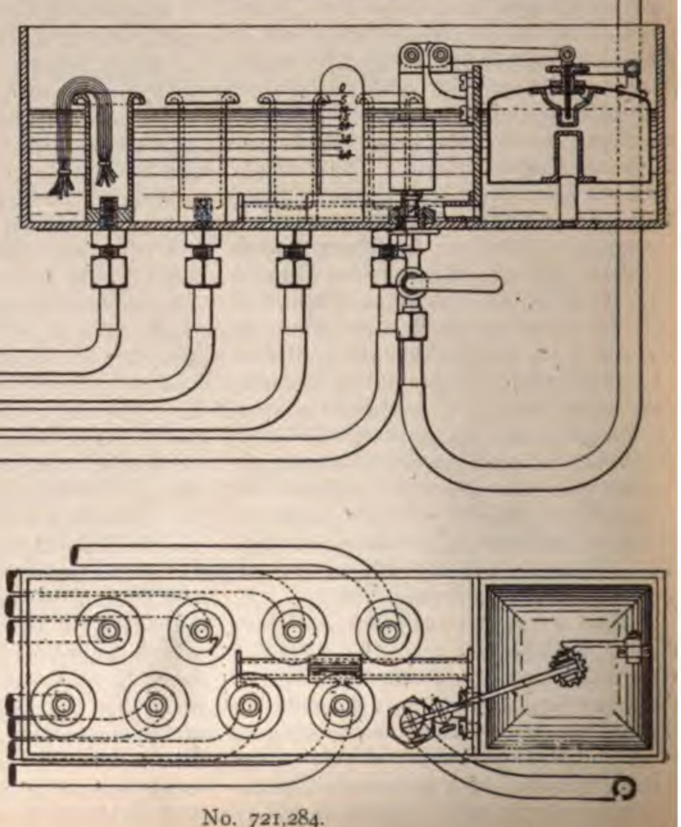
No. 721,199.

The improvement relates particularly to means for regulating the level of oil in the distributing compartment. At the bottom of this compartment is fixed a valve, communicating with an oil reservoir by means of a pipe. Said reservoir may contain a sufficient quantity of oil to keep the apparatus going for a long time. The valve has a seat, on which rests a valve plug controlled by a float, which is guided in all directions by means of a square guide, engaging in a socket of the same form, arranged in the lower part of the float. The valve is rendered independent of the movements of the float by means of a lever, rocking at the end of a support, screwed on the partition wall. Pivotally depending from one end of the lever is a bar, screw threaded with a pitch of 1 millimetre, the length of which bar varies according to the size of the apparatus. A nut on the bar engages with the top wall of the float and is held from rotating by means of a toothed flange, with which engages a tooth at the end of a spring arm mounted on top of the float.

721,199. Speed Indicator.—C. E. Kelly, of Anderson, Ind. February 24, 1903. Filed October 18, 1901.

The pointer on the dial is moved through a pinion and toothed sector within the case of the instrument. The sector is held in the zero position by means of a flat spring and is moved from this position by a slidable rod bearing against it. The rod passes through a hollow sleeve rigidly fastened to the case, and at its outer end carries a spider with four arms, having their outside edges inclined. Against these inclined edges bear metal balls confined between these arms and a disk at the outside of the driving wheel.

Now, when the wheel is turning the grooved spherical weights are forced outward, and these weights, acting between the inclined edges of the ribs and the wall of the wheel, force the ribs or spider to the right. This causes a like movement to be given to the slidable rod, and the toothed sector is therefore thrown. Movement of the sector around its axis will

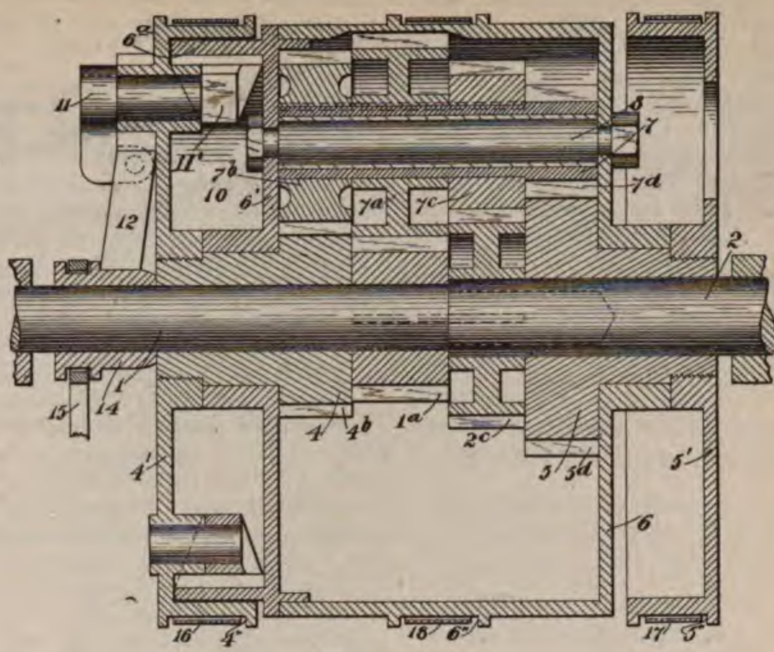


No. 721,284.

turn the arbor and thus throw the needle over the dial, the movement of the needle being commensurate to the extent to which the spider is moved.

721,193. Speed Changing and Reversing Mechanism.—Carl C. Riotte, of Jersey City, N. J. February 17, 1903. Filed January 9, 1902.

The device is of the planetary type and its action is described as follows: When the clutch 10 6' is open and all the straps 16 17 18 are loose, so that the members 4', 5' and 6 can all turn freely, the rotation of shaft 7 will result only in an idle rotation of one or more of these members without transmitting power or movement to shaft 2, this being the disengaged or unclutched position. For rotation "ahead" at highest speed the clutch 10 6' is closed or engaged, and the box 6 is thereby forced to rotate with wheel or member 4', and therefore with sleeve 4 and gear 4^b. The engagement of gear 4^b and 7^b then locks the shaft 7, so that it is kept from rotation on its axis, but revolves around the axis of shafts 1 2. As gear 7^c on this shaft must revolve in the same manner, it will turn gear 2^c and substantially lock the shafts 1 and 2 together, so that they will revolve at the same speed. To go ahead at medium speed, the clutch 10 6' is opened and the member 6 is held by strap 18, so that shaft 7 is held in fixed position and can move only by rotation on its own axis. The train of gears 1^a 7^a 7^c 2^c then drives shaft 2 at a slower speed than shaft 1. For slower speed in the same direction clutch 10 6' and straps 16 18 are released and strap 17 is tightened to hold member 5' and sleeve 5 from rotation. Gear 5^d being thus held stationary, the gear 7^d on shaft 7 is forced to roll around it in planetary manner, and owing to the difference in gear ratio between the pairs of gears 5^d 7^d and 2^c 7^c the shaft 2 is turned at a slow rate of speed by a differential effect, the gear 7^d not moving the shaft 7 backward quite fast enough to compensate for the forward drive from that shaft to shaft 2. To reverse, the clutch 16 only is engaged, whereupon the gear 7^b will roll on gear 4^b, now held stationary, the relation of gears 4^b 7^b and 7^c 2^c being such that shaft 7 is allowed to move backward faster than will compensate for the forward drive from that shaft to shaft 2, with the result that said shaft 2 is driven in a reverse direction to the movements above described and at a slow speed.



No. 721,193.

719,327. Transmission Gear Mechanism.—Ralph B. Hain, of Los Angeles, Cal. January 27, 1903. Filed July 30, 1902.

This transmission gear is of the sun and planet type and the operation is as follows: Assuming the brake K to be applied to the drum J to hold the same from rotation, the movement of the shaft E through the pinion E' rotates the pinions C' and carries them around the orbit gear D, and thereby imparts motion to the drum A, it being understood that the shafts C at this time revolve in their bearings carried by the drum A, as it, together with the hub G, during the said adjustment of parts, will now travel in the same direction of rotation of the main shaft, but at a slower speed. When the brake K is released and the brake L applied, the drum I, with the main shaft E, running as before, the motion of the drum J is reversed, which now receives a direct power from pinion C', gear C, and the internal gear D. This action of the gear C causes the small gear C^2 to rotate around the gear F on the brake drum I in an opposite direction to the main shaft E, and thereby produces a reverse motion of the drum A, the sleeve G, and the sprockets H' H at a speed slower than that of the main shaft E. When both brakes K and L are released from their respective drums, the main shaft E is free to rotate, while the gear C', with the drum A, its sleeve G, and the sprockets H H' are at a standstill, while the brake drums J and I revolve in opposite directions to each other. Now when in this position by applying the friction clutch devices for joining the shaft E and brake drum J, the entire mechanism will be locked, and the drums J and I, pinions C C', drum A, with its hub G, together with the sprockets H H', will all revolve with and at the same speed of the shaft E.

721,340. Tube Expander.—James S. Stevens, Barberton, Ohio. February 24, 1903. Filed October 8, 1901.

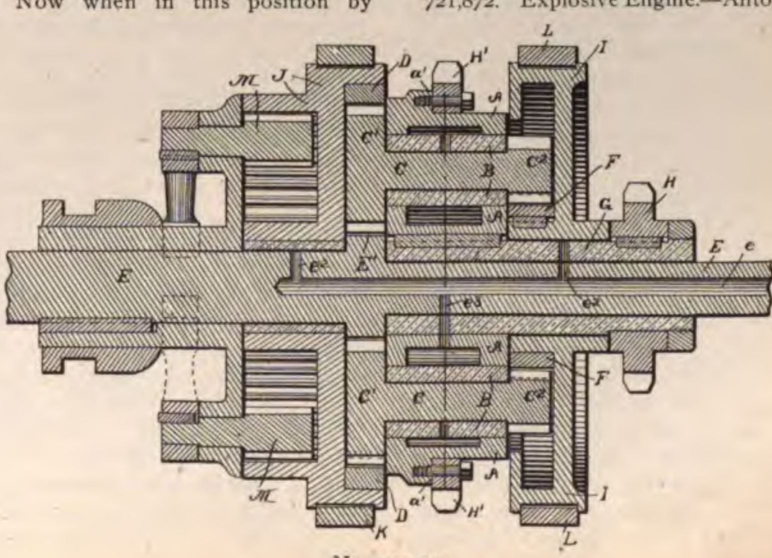
721,380. Vehicle Wheel.—Ralph L. Morgan, Worcester, Mass. February 24, 1903. Filed February 3, 1902.

721,401. Variable Speed Gearing.—Colcord Upton, Beverly, Mass. February 24, 1903. Filed December 27, 1899.

721,595. Pipe Joint and Valve in Connection Therewith.—Thomas W. Moran, Louisville, Ky. February 24, 1903. Filed January 4, 1902.

721,736. Transmission Mechanism.—Alden E. Osborn, New York, N. Y. March 3, 1903. Filed September 3, 1901.

721,872. Explosive Engine.—Anton Even-



No. 719,327.

sen, Chicago, Ill. March 3, 1903. Filed November 2, 1900.

721,986. Steering Apparatus.—Frederick R. White, Lynn, Mass. March 3, 1903. Filed June 12, 1902.

721,995. Power Transmitting Means for Engines.—John C. Blevney, Newark, N. J. March 3, 1903. Filed January 29, 1900.

722,008. Pump for Combustion Engines. —George A. Gemmer, Marion, Ind. March 3, 1903. Filed November 21, 1901.

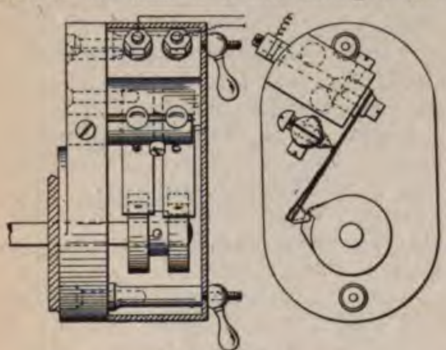
722,089. Change Gear for Motor Road Vehicles.—Albert De Dion and Georges Bouton, Puteaux, France. March 3, 1903. Filed September 10, 1902.

722,122. Device for Throwing Motors Into Gear.—Ludwig Maurer, Nuremberg, Germany. March 3, 1903. Filed May 15, 1902.

722,176. System of Producing Electrical Sparks for Igniting the Charges of Explosive Engines.—George W. Euker, Richmond, Va. March 3, 1903. Filed July 9, 1902.

721,065. Gas Engine Igniter.—Louis P. Mooers, of Cleveland, Ohio. February 17, 1903. Filed October 24, 1901.

The invention relates to a trembler with double cams, springs and contact points. One of the cams is a disk having a cam



No. 721,065.

projection substantially in the shape of a ratchet tooth. The cam projection on the other disk is inclined on both sides. As these two cams rotate in unison, their inclined faces engage with the fingers on the two springs, respectively, and bend the springs so that they engage with the contact points of the two contact screws respectively. This closes the primary circuit and a current passes through it, but a moment later the ratchet tooth passes the finger of the corresponding spring, which causes this spring to vibrate and make a series of successive contacts and interruptions, resulting in a shower of sparks in the cylinder. A moment later the other cam also passes the finger on its spring and the primary circuit is then broken at two points, and it is not at all probable that through any accident both springs will simultaneously contact with the points, and therefore it is not possible that any spark shall be created except at the desired time —namely, when the two cam projections acting on the springs have closed both breaks in the primary circuit and the vibrating spring has been allowed to fly away from its point.

720,326. Process of Preparing Storage Battery Plates.—Rufus N. Chamberlain, of New York, N. Y. February 10, 1903. Filed March 3, 1899.

This invention relates to improvements in processes of preparing storage battery plates, the improvements covering the pickling and roughening of the plates preparatory to forming them.

It has been customary to pickle lead battery plates by subjecting them to the action of strong nitric acid. This process usually involves the waste of acid, and owing to the constant tendency to neutralization of the acid the process is not as regular and certain as could be desired. The pickling of the lead storage battery plates preparatory to forming them is greatly facilitated and nearly a complete saving of lead and of the pickling agent is effected by constituting the plate the anode in an electrolytic bath containing the pickling agent, such as a solution of nitric acid, and collecting on the cathode of such bath the lead which has been dissolved by the pickling solution and electrolytic action of the current. The object of the pickling is, first, to remove the superficial glaze or surface of the lead plate and develop a rough or grain surface thereon, and, second, to remove from the plate, as far as possible, the impurities which are more soluble than the lead.

In the process covered by the invention a pickling vat is used having a cathode surface, which may be the lining of the vat itself, and an anode terminal is provided, to which the plates to be treated are attached or connected. The bath contains a solution consisting of 4 to 6 per cent. solution of nitric acid in water. The unaided action of such a solution on the lead plate would be extremely slow; but by connecting the bath in an electric circuit, so as to constitute the plate an anode, it is rapidly cleaned. The lead dissolved from the plate when it is allowed to remain in the solution rapidly deteriorates the latter; but, by the electrolytic action it is removed as fast as it is dissolved and is deposited on the cathode surface, thus at once maintaining the efficiency of the pickling fluid and conserving the lead, which would otherwise be wasted. When a plate has been thus treated in the pickling and roughening bath until it is properly pickled and roughened, it is removed and another one inserted, the successive plates thus contributing a portion of their material successively to the bath, but the superfluous dissolved material being prevented from accumulating by reason of the continual deposition of the same on the cathode.

720,713. Motor Vehicle.—Charles A. Lieb, New York, N. Y. February 17, 1903. Filed April 5, 1902.

720,752. Internal Combustion Engine. —Constantine L. Straub, Perth Amboy, N. J. February 17, 1903. Filed March 14, 1902.

720,809. Life Guard for Road Vehicles.—Arthur Hudson, Gorton, Manchester, England. February 17. Filed October 20, 1902.

717,754. Hydrocarbon Burner and Attachment.—W. J. Lane and George Lane, of Poughkeepise, N. Y. January 6, 1903. Filed May 12, 1902.

The burner comprises a large number of parallel tubes of different lengths extending from opposite sides of a large tube running centrally across the burner casing and projecting therefrom at one side. The regular mixer tube is arranged centrally within this large tube. The gasoline is led through vaporizing tubes once back and forth across the burner top, then passes the diaphragm control valve and is injected through the vapor nozzle into the mixer tube in the usual manner.

Situated under the vaporizing tubes is the igniting device, which consists of a central perforated tube attached to the casing by means of a nut. By removing this nut the perforated tube and its covering may be withdrawn for inspection and repair.

The perforated tube is connected at its left hand end to a non-perforated tube external to the casing and having on its end a cup, which may be given any convenient location upon a motor vehicle.

Surrounding the perforated pipe is a covering of asbestos. When it is desired to light the burner, alcohol or other inflammable fluid is introduced into the cup. Such fluid flows to the perforated pipe and saturates the covering of asbestos. The fluid saturating the covering can be readily ignited by a match introduced through the door on the left hand side of the casing. Upon lighting the inflammable fluid held in the interstices of the asbestos covering the flame will impinge upon the vaporizing tubes and heat them. When sufficiently heated, the fuel supply valve is opened, which allows the hydrocarbon fuel to flow into the vaporizing tubes, where it is immediately vaporized and delivered to the injector, thence to the fuel supply tube of the burner, and thence into the mixing chamber and transverse burner tubes, to be delivered at the burner openings of the mixing chamber and tubes and ignited by the flame of the torch.

720,759. Explosive Engine.—Henry W. Tuttle, of Philadelphia, Pa. February 17, 1903. Filed May 2, 1902.

The patent covers a construction of two cycle engine, with telescopic piston, in which the part of the cylinder serves to compress air for scavenging the combustion chamber during the first part of the return stroke.

720,653. Electric Battery.—Vincent G. Apple, of Dayton, Ohio. February 17, 1903. Filed June 3, 1901.

In this battery the wall of the containing cell is constructed integrally with one set of the electrodes of the cell. The opposite set of electrodes are also formed in one integral construction and when completed are adapted to alternate with the plates.

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A Remarkable Fuel Efficiency Record.

In the recent fuel consumption contest near Paris, which is reported on another page of this issue, the record for fuel economy established at the previous annual contest was greatly improved by the winner, and was beaten by quite a number of the contestants. The result achieved is really remarkable and points to an excellent condition of roads, a thorough study of the fuel economy problem by the respective manufacturers and very skillful operation. The high economy of the winning vehicle is perhaps best appreciated when it is noted that the vehicle standing at the foot of the list in the general classing consumed more than four times the amount of fuel per ton mile, and that the economy claimed by American manufacturers of light cars (which economy is seldom attained by the private user) is only one-third as high. The record is also better by 60 per cent. than a record established in the Long Island Endurance Contest last year. It must be admitted, however, that ton mile records of economy made in different contests cannot be directly compared; first, because of the difference in the roads, and then because of the difference in the rules. In the Long Island contest, for instance, the chief care of the operator was to avoid stops, and the fuel consumption contest was only a secondary consideration.

These improvements in fuel economy constitute a practical advance in the art of automobile construction, and each new record forms a milestone on the path of this advance. High fuel economy depends largely upon complete combustion under all conditions, and improvement in fuel economy is therefore to a certain extent associated with reduction of smoke and smell.

The practical character of these fuel consumption contests cannot be denied, and it is to be hoped they may grow in popularity.

Exemption from Taxation of Alcohol for Industrial Purposes.

On June 3, 1896, Congress appointed a joint select committee, consisting of three Senators and three members of the House of Representatives, to consider all questions relating to the use of alcohol in the manufactures and arts free from tax, and to report on its conclusions. The committee made a very exhaustive investigation of the subject, heard testimony in New York, Chicago, St. Louis, Cincinnati and Washington, and even sent an agent to Europe to gather information there.

In the report of the committee it was stated that the conclusion had been reached that "it would not be expedient under existing conditions to exempt alcohol or any other form of distilled spirits from the payment of internal revenue tax when used in the arts and manufactures."

On the question as to the practicability and expediency, under other conditions, of freeing from taxation alcohol used in the arts and manufactures the committee was not able to reach an agreement, and three separate statements of views are therefore given in the report. What seems to have been the most important of the "existing conditions" referred to as rendering it inexpedient to exempt alcohol from taxation is the unsatisfactory condition of the Government revenues at that time, and two of the members of the committee considered this the only objection to the proposed exemption.

Since the time this report was submitted to Congress the condition of Government revenue has much improved and a new possible field for the use of alcohol has sprung up, the limitations of which cannot be properly estimated at the present time. We refer, of course, to the use of alcohol as a motor fuel. It is true that with present prices of gasoline alcohol stands little chance of competing successfully. It is

equally true, however, that the price of gasoline has been advancing rapidly during the last several years and that the possible production is limited and may soon fall far short of the rapidly increasing demands.

If these changing conditions should in a few years make alcohol a practical motor fuel the automobilists of America might still be in an advantageous position compared with the automobilists of Europe, provided Congress could be induced to remove the tax from alcohol used for industrial purposes. Grain is produced much cheaper in the United States than abroad and is now shipped there in large quantities. Consequently, without tax the alcohol could also be produced much cheaper here. It is to be remarked that the term "alcohol for the arts and manufactures" in the above report is intended to include alcohol for all uses except as a beverage.

How About Our Spring Contests?

There is a most favorable period or part of the season for automobile contests as there is one for automobile exhibitions. Contests of long duration are preferably held during the fall, when meteorological conditions are most stable, but for the shorter one day contests early spring, when the air is warm again, is the most suitable period. This impression is affirmed by the growing sentiment that shows held late in the season are generally more successful from the standpoint of sales to private individuals, simply because there is at that period a greater desire to buy among these.

These small contests are chiefly demonstrations and intended to influence possible buyers, and in consequence they should be held at a period of the year when buyers are most open to influence.

While the calendars of European automobile events show that a very large number of contests are being organized abroad for the season, no contest whatever has yet been decided on in this country, except the contest of vehicles for commercial purposes. Perhaps the fact that the National Association of Automobile Manufacturers has taken up the question of contests has caused the clubs to pause and defer the organization of contests. The first 100 mile run last year was made in the middle of April and had been announced about two months earlier. It was held under favorable auspices and proved a success. That date is certainly none too early, but this year there will hardly be any events during the month of April, as the time for preparation is getting too short for that.

We believe the discussion of the N. A. A. M. has reference mainly to the chief event of the year, and that clubs wishing to hold contests during the early spring should proceed with their arrangements. If they can work out a practical set of conditions and offer a fair guarantee that the affair will be carried out according to program they will meet the support of the industry.

How the Automobile Widens the Sphere of Man's Activity.

An enthusiastic article on the improvements in the conditions of life brought about by the introduction of the automobile has been published in the *World's Work*, by Henry Norman, a member of the Automobile Club of Great Britain and Ireland. The revolution which the automobile will effect, he says, will be as remarkable as that worked by the locomotive. The basis of Mr. Norman's argument is that the radius of the horse keeper of to-day is about 12 miles, while the radius of an automobilist owning a moderately powered machine is easily 30 miles. The circle representing the area which the horse owner can cover measures 452 square miles, while the automobilist covers as easily an area of 2,827 square miles, or more than six times as much.

The car owner may therefore visit any place of worship, physician, etc., attend any lecture or concert, or keep a business engagement within an area of 3,000 square miles with his own conveyance. "The possession of a car multiplies the contents and the effective sphere of man's life."

The effect upon the community, moreover, will be as widespread as upon the individual, and Mr. Norman prophesies that the old coaching roads and coaching inns will once more be thronged with travelers; that country residential property will rise in value and that there will be an exodus of city dwellers to the country.

Abuses of Chauffeurs to Be Checked.

Abuses are claimed to be spreading among the chauffeurs of wealthy automobilists who keep their machines at storage and repair stations, particularly the practice of exacting commissions from the storage station keeper on all bills charged to their employers. This practice has been called to the attention of the board of governors of the Automobile Club of America, and a special committee has been appointed by the board to investigate the subject and suggest a remedy.

It is alleged that some of the chauffeurs who have entire charge of their employers' motor cars demand commission on all supplies bought, as well as on the storage bills, and threaten to stop patronage if their demands are not acceded to. If these reports are true and represent a general condition, there certainly is need of an investigation and effective remedies, the manufacturers being as much interested in having the evil removed as the owners who are directly affected. Another just as serious abuse is said to consist in the custom on the part of chauffeurs renting out the vehicles of their employers to strangers.

No steps have yet been taken by the committee appointed to check these abuses, and it is therefore not yet known what the remedy will be, but it has been suggested that the club license such stations as will agree to pay no commissions to chauffeurs. As there are few employers of chauffeurs in New York city who are not members of the club this method of dealing with the question promises to check the evil. The scarcity of good chauffeurs has been one of the causes of the abuses, but with the assistance of the A. C. A., and possibly also the N. A. A. M., an effective stop will soon be put to it, no doubt.

Slow Growth of the Motor Bicycle Business.

In the United States the motor bicycle does not seem to make nearly as rapid headway as the heavier automobiles and can hardly be said to promise a repetition of the boom in popularity which the bicycle enjoyed a decade ago. The motor bicycle costs little more than the bicycle did in its early days, and as far as means of purchasing is concerned it is available to a large class of people. The simultaneous appearance of the automobile, and particularly of the light runabout, undoubtedly greatly limits the market for motor bicycles, as those who can afford them usually prefer the runabouts. This fact is generally recognized, and the relative advantages and disadvantages of motor cycle and motor car are often compared by those who would create sentiment in favor of the motor bicycle.

The motor bicycle is certainly much cheaper to operate than even the lightest cars. It requires less than one-half the

power and entirely avoids the change gear; there are only two tires instead of four, and neither of the two carries nearly the load that an automobile tire must carry. The disadvantage of the motor cycle as compared with a car centers chiefly in its lack of comfort.

The popularity of the motor bicycle in England ought to furnish our manufacturers engaged in that line food for profitable reflection. It cannot be said that the manufacture of motor bicycles is more highly developed in England than here, as most American makes are successfully marketed there and considered as good if not better than those of native and of continental construction. The cause for the greater popularity of the motor bicycle in England must therefore be based on other conditions. Possibly the reaction following the bicycle boom in this country has subdued the public's interest in anything going by the name of cycle. Possibly, also, the poor roads of this country intensify the lack of comfort of the motor bicycle and make it still less practical here than in England.

An Outrageous Automobile Bill in the Pennsylvania Legislature.

Of all the obnoxious automobile legislation which has been proposed or enacted the present winter, the bill just introduced in the Pennsylvania Legislature may well be regarded as the limit. It seems to have been drawn up on the supposition that automobiles on the highways constitute an inherent danger to the public, that for the public good their use must be limited as much as possible (like the use of intoxicating beverages), and that an elaborate system of examining, licensing and bonding is required to prevent serious calamities.

The most objectionable features of the Grimm bill appear to us to be the following:

The speed limit of 12 miles an hour in the country is much too low. The requirement of licenses for the operation of all kinds of vehicles is unjustified; electric and simple gasoline machines are commonly operated by women and children, thus proving that no special mechanical knowledge is required for operating such simple vehicles. The annual license fee is an injustice, as other users of the roads are not required to pay any such fees, and the automobile has a tendency to improve the roads instead of destroying them like horses and horse vehicles. The bond required to be filed by non-residents of the State wishing to secure a license would most injuriously affect and even kill automobile touring.

Let us suppose, for example, that similar laws were adopted by all the States. Then, if an automobilist wanted to make a tour down the Atlantic Coast, he would have to file bonds to the extent of $50,000 or more and take out licenses necessitating the payment of more than $100 in license fees. Under such conditions it is easily apparent that automobile touring would be reduced to nil, or forever remain a fad of the rich. The Philadelphia and Pittsburg automobile clubs and the A. A. A. should take immediate steps to send this unreasonable measure to the limbo of fanatic laws.

Gearless Gasoline Cars.

By Albert L. Clough.

One of the ideals in the automobile art which is often referred to as a possibility of the future is the gasoline vehicle with direct connected motor, untrammeled by any change speed mechanism—the gearless gasoline car. That it is a most attractive conception cannot be denied. To secure all the economy and all the convenience of the internal combustion motor, together with ideal simplicity and absolute flexibility of operation, with a controlling system restricted to a single throttle and a single clutch, would indeed savor of perfection.

It is interesting to note that American practice has advanced quite a long step toward the realization of this conception by its early adoption of the slow speed, flexible, throttle controlled motor with large flywheel capacity. With some machines of this description, if not too high geared, one may make long trips under favorable conditions without resorting to a single change of gear, all changes in the torque required being met by the throttle. It is a long step up to such a result as this, from the governed motor and four speed gear of characteristic European extraction, in which the flexibility of the motor torque hardly seems to have been relied upon at all as a means of controlling the car and all reliance placed upon the change of gear, so that over the average American country road an almost incessant handling of the gears is necessitated. Upon the roads of the Continent, which were mostly laid out by engineers rather than by wandering cows, with gentle and uniform grades, a car of this kind will doubtless operate with less annoyance from gear shifting.

It would be interesting to know how much of the present annoyance from gear shifting would still remain if existing gasoline cars were geared down, by a change of sprocket ratio, to a maximum speed equal to the legal limit of 15, or at most 20, miles per hour, which is now almost universal. If this were done, the cars which are now capable of making from 30 to 40 miles per hour on the level on the direct driven high speed would, in all probability, become practically gearless in operation over long stretches of our better class of country roads and entirely gearless in all ordinary city use. So far as ease of handling is concerned, one of these cars would probably approximate to the ideal now being considered, but the engine would be so lightly loaded when running on the level that there would probably be a constant temptation to speed it up beyond its allowable number of revolutions by spark advancing, in order to gain a few miles per hour on good roads.

The writer is of the opinion that most of the physicians who have been sighing for "gearlessness" of operation could secure it, to all intents and purposes, by changing their sprockets to such an extent as to give their machines a maximum of, say, 15 miles per hour on the direct drive. A machine so modified would always be within the law while in the open country, and would not have to resort to the gears in order to reduce the speed to 8 miles per hour in the city. In hilly districts very little sacrifice of actual traveling ability would result, as the resort to the low speed would be so extremely infrequent. Of course, upon the rare occasions, when the use of the low speed was necessitated, progress would be exceedingly slow, but there would be the satisfaction of knowing that one could climb a pitch roof if such a thing were ever encountered.

It is somewhat surprising that the result of speed legislation has not been more widespread gearing down of vehicles, and one is led to the conclusion that this legislation is not accepted seriously by the majority of automobile users, as otherwise they would reduce the gears of their machines and secure the double advantage of gearlessness of operation and freedom from the possibility of law breaking.

Fifteen miles per hour appears to be nearly the maximum speed which the moderate powered automobile can average over the country roads of most sections of this country, and it is doubtful if the big touring cars can do much better than this without excessive depreciation. A full powered car, geared down to a maximum speed of from 15 to 20 miles per hour, would be found to average nearly as well as this, even through hilly country, simply because it could maintain this speed quite steadily under almost all road conditions owing to the large reserve of torque in the motor, which would enable the high gear to be adhered to.

To secure practical gearlessness of operation in a gasoline car by a considerable sacrifice of speed upon the level merely amounts to placing a large part of the existing motor capacity in reserve, and is a fairly easy proposition, but to secure the "gearless" ideal without any sacrifice in speed qualities is a very different matter.

Practice has shown that the best speed ratio between the highest and the lowest gear of a gasoline car is 5 to 1, or 4 to 1 at the least. This means that the turning movement exerted upon the driving axle upon the low gear is five times that exerted when the high gear is in use. Allowing for the loss in the driving gears, it is hardly to be doubted that the torque or low gear would average four times that on high gear in American motor cars as a whole. Any lower ratio than this has been demonstrated to be insufficient for negotiating the worst hills and heavy roads without the sacrifice of some of the speed which has appeared desirable to the public.

In order, therefore, to duplicate these driving requirements, the torque capable of being exerted by the direct connected motor must be four times that of the geared motor, and this quadrupled torque must be exerted at a quarter speed.

This enormous increase in engine torque would call for a motor of quadrupled piston displacement and would practically demand a multicylinder construction or a balance wheel of excessive capacity, or both, in order to secure a uniform torque at very low speed, such as would be required to pull the vehicle out of a hole. The mere attainment of a motor capable of four times the torque would not necessarily prove impossible from considerations of added weight, on account of the fact that the piston displacement will increase more rapidly than the quantity of metal involved. The weight of the speed changing gear which would be eliminated would doubtless go far toward making up for the extra weight of the motor. It is quite possible that such a machine could be successfully constructed. In ordinary use its engine would be run very closely throttled, and, unless it were specially constructed with somewhat contracted ports and valves, it would have a tendency to "race" on full throttle when running over easy going roads and would then have enormous speed possibilities not to be countenanced in this time of restrictions. As an engineering proposition, the carrying of such large reserve engine capacity hardly seems to be warranted by any objections which appear to be really inherent in and inseparable from a properly constructed transmission gear. It is obvious that the friction clutch which would be required in the gearless gasoline car would be subjected to fearfully hard usage and must needs be of the most substantial and durable character.

It must be admitted that there is too much changing of gears in the operation of the average gasoline car and that a direct connected motor seems the obvious remedy, but when it is remembered that nine-tenths of this gear changing could be done away with by a judicious gearing down of existing cars this objection must largely disappear, and the desire for the gearless car with its enormous engine reserve and dangerous speed possibilities be somewhat dispelled.

So long as the internal combustion motor remains an internal combustion motor, developing during each instant within its cylinders the power absorbed at that particular moment, and possessed of no reserve or storage of energy capable of being instantaneously realized upon, it cannot profitably be applied in the same manner as other prime movers, such as the electric motor and the steam engine.

What may be the result if an explosion motor ever be developed which merely utilizes the heat energy developed in a separate combustion chamber of some capacity for thermal storage it is almost fanciful to conjecture. Perhaps it may conduce to an early realization of the happy state of "gearlessness."

THE START FROM THE WATER WORKS IN SURESNES.

The "Auto" Fuel Consumpt Contest.

The annual fuel consumption conte *L'Auto*, the organ of the Automobile of France, took place on Thursday, ruary 19, in the vicinity of Paris. pleasure vehicles which competed i contest ran over a distance of 100 metres (62.1 miles) from Suresnes to beil and back, and the goods vehicle industrial vehicles as they are call the rules, covered a distance of 60 kil tres from Suresnes to Longjumeau back. The road this year was in fine dition, which fact undoubtedly la contributed to the establishment of th markable economy records which made. The route is quite hilly, but thought that this did not greatly affe records, as the motors were shut going down hill.

Popular interest in these fuel eco contests has always been conside owing to the high price of gasoli France, and the contests appear to resulted in a great improvement in omy, as each year the fuel consum per ton kilometre has been much red What added to the interest of the c this year is that the French Govern has decided to secure a monopoly sale of petroleum and its produc France, which will undoubtedly still ther raise the price of gasoline.

The total number of entries in the test was not quite as large as last the entries in all classes reaching six, but only forty of these started. but two of the starters complete whole journey. The vehicles entered divided into two groups, pleasure hicles and industrial vehicles, and were again divided into classes acco to weight, as is the custom in all the tests of the Automobile Club of Fr The judges committee was compos Messrs. G. Forestier, L. Perisse, Lep Famechon, Georges Prade and the Lo mare brothers.

Among the prizes offered to wi vehicles was a gold medal donated b Minister of Agriculture for the v using alcohol which should obtain th position in the general classing. It here be explained that the competin hicles were classed in the class to they belong simply upon the basis o consumption, without regard to w the vehicle consuming the least fu any class being the winner in that all the vehicles competing in the c were also classed according to fuel omy on a ton kilometre basis. A d'honneur was offered the team of vehicles (designated in advance) o one manufacturer which collec should show up most favorably i general classing. A special gold was offered for the carburetor on th first in the general classing; another medal to the driver of the winnin

General Classification According to Fuel Economy.

Order of Merit.	Make, Official Number, Remarks.	Weight. (Lbs.)	Fuel Consumption in Gallons.	Ton-Miles per Gallon.
1	Peugeot (35), Industrial....	10,296	3 63	53.0
2	Bardon (26), Industrial....	2,937	1.84	52.2
3	Peugeot (33)................	2,132	1.37	48.3
4	Chenard & Walker (16)....	2 552	1.66	47.8
5	Bardon (25).................	2 640	1.88	43.8
6	Chenard & Walker (17)....	2,596	1.91	42.2
7	Peugeot (32), Alcohol......	1,980	1.51	40.8
8	Bardon (24).................	2,497	1.94	40.1
9	Peugeot (34).	1,958	1.57	38.8
10	Mors (19)...................	2,650	2.27	36.4
11	Sage (14), Industrial.......	5,665	2.90	36.3
12	Mors (21)............	3,388	2.95	35.8
13	Bardon (28).................	1,973	2.18	35.7
14	De Dion (41)................	1,320	1 16	35.4
15	Gillett-Forest (3)...........	1,936	1.72	35.1
16	De Dion (42)................	1,276	1.17	33.9
17	Regina (56).................	2,860	2.77	31.4
18	Hurtu (39)	2,420	2.42	31.1
19	Gillett-Forest (2)...........	2,024	2 03	31.0
20	Herald (37).................	2,530	2.56	30.8
21	Gillet-Forest (1), Industrial	3,652	2 30	29.7
22	Mors (22).....	2,838	3.02	29.4
23	Hurtu (40), Alcohol.........	1,892	2.03	28.7
24	Herald (36).................	2,585	2 81	28 6
25	Chenard-Walker (15).......	2,024	2.20	28.5
26	Automotrice (11), Alcohol..	1,606	1.77	28.2
27	De Dion (44)................	1,320	1.54	26.6
28	Abeille (49)................	2,640	3.11	26.4
29	Enviable (51)...............	1,914	2.32	25.7
30	Brunel (54), Alcohol, Indus.	2,882	2 59	25.2
31	Turcat-Mery (30)...........	2,992	3.78	24.5
32	Boyer (50)..................	3,608	2.27	19.2
33	Mors (20)...................	2,926	4.94	18.5
34	De Boisse (31)..............	748	1.45	16 2
35	Europeenne (38)............	1,258	3.00	12.0

hicle and a third for the vehicle showing the greatest economy as regards cost of fuel used. A silver medal was offered by *La France Automobile* to the four passenger car standing highest in the general classing; a silver medal by the *Revue des Transports* to the first industrial vehicle using alcohol, and a gold medal by *La Locomotion* to the vehicle of standard type standing highest in the general classing.

Four of the forty vehicles employed as fuel a 50 per cent. mixture of alcohol and all the rest gasoline. It is significant that the number employing alcohol was not greater, considering that the gold medal offered by the Minister of Agriculture

At the Finish.

must have been a strong inducement to use that fuel. Taking the entries by classes, there were 5 in Class I (250 to 400 kilogs.), 6 in Class II (400 to 650 kilogs.), 15 in Class III (650 to 1,000 kilogs.), 5 in Class IV (over 1,000 kilogs.), 2 in Class I of the industrial vehicle section (carrying less than one ton of load), and 3 in Class II of the industrial vehicle section (carrying more than one ton of load).

The winners in the different classes were as follows: Class I, 6 horse power De Dion (No. 41); Class II, 6½ horse power Peugeot (No. 33); Class III, 10 horse power Chenard-Walker (No. 16); Class IV, 8 horse power Bardon (No. 25); Class I of industrial vehicles, 6 horse power Gillet-Forest (No. 1); Class II, 5 horse power Bardon (No. 26). The accompanying table gives the general classification according to fuel consumption per "tonne kilometrique."

We have changed the figures in this table to English measure to make them more easily understood by the reader unaccustomed to the metric system.

The special medals above referred to were awarded as follows: The gold medal for the carburetor on winning car, to the Peugeot firm; the petroleum refining firm of Lepretre secured the medal for having furnished the gasoline used on this car, and M. Pessonneaux was awarded a medal as the driver of the winning car; the gold medal of the Minister of Agriculture was awarded to a 6½ horse power Peugeot car (No. 32), using alcohol; the *La France* silver medal to a four passenger Chenard-Walker (No. 16), and the *Revue des Transports* silver medal to the Prunel truck (No. 54), using alcohol.

The accompanying table shows that the winning vehicle, the Peugeot truck, devel-

Measuring the Gasoline With a Graduated Vial.

Paying the Municipal Toll on Gasoline at the Gates of Paris.

oped a fuel economy more than four times as great as the last vehicle in the list, which furnishes a very good illustration of the possibilities in the line of fuel economy. On the whole the heavier vehicles have a slightly higher economy (the winning vehicle was the heaviest among those competing), but this rule is not very pronounced in the results.

A Home Made Enclosed Doctor's Automobile.

By A. C. Cluts, M. D.

After using an automobile for a year in all kinds of weather, except during the winter months, I concluded that I might as well have a vehicle affording all the comforts of a parlor car. If we use the horseless vehicle, why not use one in which we can ride inside?

I have constructed a vehicle of this kind, of which I send you a photo herewith. I used 30 inch wood wheels, a steel frame, roller bearings, 80 inch wheel base, a 12 horse power double cylinder motor, and wheel steering gear. The vehicle was geared to run at 15 miles an hour and was provided with a cab with windows all around so as to give a good view of the road ahead and of surrounding objects. The front window can be swung up to the roof and the rear window slides down behind the seat cushion. The body is provided with a double bottom, the lower one below the engine so as to heat the interior of the vehicle by means of the motor heat. When there is no necessity for heating the cab the heat of the motor can be diverted by opening one and closing another trap door. In this manner the operator can regulate the temperature of the cab very conveniently.

Being a physician and having to make calls in all kinds of weather, I think a machine of this kind would be just the thing for the profession. To avoid punctures and consequent delays, I used 2 inch solid rubber tires, and for muddy roads I have had made a clamp to put on the wheels so arranged that the weight is supported on the steel rims instead of on the rubber. These clamps can be removed when the roads are dry.

I have not yet made a trial run with my machine, owing to my failure to get the engine to run. I have been at it for three days, but have so far been unable to get more than two explosions at a time. My experience with gasoline motors is limited, and so are the instructions sent out by the manufacturers. They have treated me very courteously and have replied to every inquiry addressed to them, but I think they ought to publish a book of instruction and thereby avoid much unnecessary correspondence. I am satisfied my motor will work when the trouble is found and corrected, but this delay is very discouraging, and I am about ready to go back to steam, which power I know I can operate, as I have had but very little trouble with my steam carriage. A steam vehicle can be heated with the exhaust steam.

LESSONS OF THE ROAD

Some First Day Impressions.

By C. Will Travis.

We all admit that most of the machines of those first days were not what they should have been in many respects, but time has brought improvements and is continuing to do so. But no matter to what state of perfection a mechanism is brought, it will continue to have its limitations, as is evidenced by the locomotive, and I find that a great per cent. of the most persistent kickers as to the cost of maintenance are men who evidently do not understand the laws of mechanics half so well as they do the limitations of the horse. If they did, their automobile troubles would be greatly decreased.

An engineer would no more think of mistreating his locomotive than he would his child or horse. He knows its limits of endurance, with how many cars, loaded or empty, or both, he can get over the grades, and at what speed, and he insists upon doing the work within these limits. Neither does the average electrician overload his motor or dynamo. He knows their limitations and the results consequent upon overloading.

The average autoist, if he has horses, knows them, each point of perfection and defect, and will refrain from pushing with the whip beyond certain limits of pace, speed and distance. Neither will he push the horse beyond its natural inclinations, be it a walk after some hard pull or effort at speed; but with his machine, whether it be gasoline, steam or electric, he hesitates at nothing short of some part of the mechanism responding. Regardless of speed, grade or roadbed he exerts a continual effort to make the machine do more. He must climb this grade on the high speed, when but yesterday he was content to mount it on the low, and then down the grade with all power. Yet he complains of maintenance. The automobile has its limitations the same as he himself and his horse, but in his machine they pass unrecognized. A greater endurance he recognizes, to be sure, but to see beyond this he needs glasses and time.

Those first days of my automobile experience were some years ago, and the memory of them is as though it had been but yesterday.

The machine, a six passenger gasoline car, was at that time considered a large one, and was of the double opposed cylinder type, with almost everything of its power equipment in pairs, a transmission with gears and clutches enough to equip two of the present type, but with no part of the mechanism where one could get at it without much discomfort if adjustment was necessary while on the road.

The chapter of events that followed our efforts to "sweeten" the machine came near proving sufficient to drive us across the river into a land of whiskey and tobacco in quest of forgetfulness. But we had that strong desire to master the situation, and our efforts had to a degree begun to show a marked success in overcoming an apparent superhuman obstinacy on the part of the conglomerate mass of mechanism.

The trial trip of some 20 miles resulted in the loss of one of the carburetor valves, spring and screw cap. The cap in this case was the valve stem guide and screwed into the carburetor shell at the bottom, with no provision other than a loose thread fit to retain it in position, and the vibration of the engine and valve movement together soon caused it to leave us en route.

The loss of these parts was not detected until the cylinder had sooted sufficiently from the excess of gasoline it was receiving to refuse to work properly, which was made plainly evident by an increasing pound. We stopped the vehicle, and an investigation soon showed one of the causes of the disturbance, and also that its mate was making preparations to depart likewise. We took immediate steps to prevent this. There being a small hole in the cap, to act as a drain, we inserted one end of a piece of wire in it, bent it along the bottom and up the side of the carburetor to a pipe, around which the other end was made fast, thus preventing further movement on the part of that cap.

We dared not stop the engine to make further inspection, for fear of not being able to start again, and so decided to retrace our way, it being a practically level one, in hopes of finding the lost members, which would enable us to realize our intended visit to the town of Newburgh. We later found that had we reached Newburgh, where we were expected, we would have been royally entertained. But in lieu of this we proceeded to thump our way home in a most distressing manner, and to the most noticeable disapproval of those we met on the road. However, we had no serious trouble, as most every driver upon hearing our approach took the precaution of getting out and holding his horses while we passed.

Upon our arrival home—our search for the missing parts having proved in vain—we ran the machine into the barn, with a deep breath of satisfaction at not having had to go through the ordeal of having to be hauled home, which was something to be thankful for.

The next day, having duplicated the carburetor parts, and while on the way to try some slight grades to test the clutch adjustment, we experienced that thrilling if not invigorating sensation of our first runaway, and of all vehicles, horse drawn, probably the worst, a milk wagon. The grade was not a very stiff one, though it

required several attempts and some clutch adjustment before we achieved a victory.

The return home caused no greater derangement than the stripping of threads in the turnbuckle adjustment of the brake rod. This, however, caused our return home to be like that of a vessel with storm swept decks entering a port of safety "on a slow bell."

Thus it continued for days; first one thing, then two others, would let go, or do something, or fail to do it, until finally there came a day when really nothing happened.

Was it possible that the entire mechanism had sweetened and was going to do its work as the manufacturers had intimated it would? We began to look forward to days spent in deep woods, along unfrequented roads, a forgotten day of overalls and grease, a dream ideal; and although we did not discard the overalls, their use was much less frequent on the road, and the trips were longer and more frequent, brimful of pleasures unthought of, that memory fondly recalls, and all because of a better understanding of an apparently obstinate mass of mechanism.

A Motor Bicycle Experience.

By L. E. French.

It was about 2 o'clock one fine Saturday afternoon that my friend G—— and I left Amherst for a short motor bicycle trip. The roads were somewhat sandy, but a motor bicycle has the advantage over its bigger brother in this respect, for there is almost always a path by the side of the road along which a bicycle can skim with a good speed.

We made good time to Sunderland, a distance of 7 miles, and as the machines seemed to be working well we decided to go on to South Deerfield. A short distance west of Sunderland a long white bridge spans the Connecticut River. After crossing this bridge my friend said he wished to stop and examine his spark plug, as he thought it was not working just right. As he busied himself with the machine I stood and admired the scenery. It was indeed a beautiful spot, the broad Connecticut River curling along the base of the Sugar Loaf Mountains, while Mt. Toby could be seen to the northeast.

Finally my friend said he was ready, so we started again, but G——'s motor refused to work properly, missing three explosions out of four. I dismounted, while my friend vainly endeavored to start his machine. Finally he came puffing up. For some reason he did not seem to be enjoying the scenery. "It's no use," he said; "I will have to start back before she gives out altogether." "Let me try it awhile," I said. He reluctantly consented to this and we changed wheels. After mounting I turned on more gasoline and the machine started off finely. I passed my friend on the bridge and his smile lighted up the road. "I guess we will have a ride after all," he said. "We might as well enjoy life while we have the chance." So we started for Deerfield. We struck a State road and made good time. As we sailed through the town the rustics stopped to see "them new fangled bikes" go by. My friend approached me, inquiring: "Shall we go to Greenfield?" "Just as you like," I replied, so we kept on.

The roads were bad in places, but we found paths on the sides of most of them. We struck a steep hill as we came into Greenfield, but we made it all right by a little pushing. After spending some time riding about town, we decided to return with all speed, as there were ominous clouds appearing in the west, and after filling our gasoline tanks we started. Everything went well until we were about 3 miles outside of South Deerfield. I had been running in advance for some time when I suddenly noticed that G—— was nowhere in sight. After waiting some time I became impatient. Finally he came puffing up, all out of breath. "Go ahead and leave me," he said; "my machine has gone back on me again." "Let me try it again," I said. So we exchanged wheels again, but to no avail this time—the machine would not start.

The situation was beginning to look serious. I glanced around. We were on a lonely road with no house in sight, 13 miles from home, with darkness settling down. After some discussion we decided that, as I could do no good by remaining and simply had to get home that night, it would be better for me to go on alone. It was getting dark fast now. The blackness settled around me until I could not see my hand held 6 inches in front of my face. How I managed to keep in the road has always been a mystery to me. There was a certain satisfaction, however, in feeling the regular throb of the engine under me. I could not see the wheel or anything to the right or left, but by looking up I could barely make out the dim outlines of the tops of the trees by the roadside. I expected any instant to feel the shock of a collision or to have the wheel wrenched from under me; but I went on and on.

Suddenly I heard a team coming, and instinctively I steered to one side and strained my eyes into the darkness, but could see nothing. There was a rattle of wheels and it had passed.

How long those 3 miles seemed! I plowed through sand and mud as I zigzagged across the road. At last I became so confused that I did not know whether I was in the road or not, so I got off and felt of the ground. Then I saw a light coming. It was a boy with a lantern. "Lost something?" he inquired. "I am looking for the road," I replied. "Over here," he called. I mounted, and was soon in darkness again.

At last I saw the lights of South Deerfield. As I came into town I struck a sand pile and came near going over. "Pretty dark night to be ridin' one of them things," came a voice from the darkness. By this time I had given up all hope of getting my wheel home that night. If I can only make Sunderland I will be all right, I thought, for there is a car line from Sunderland to Amherst. The road was good, so I kept on. Soon I was in total darkness again.

Suddenly there was a tattoo of horse's hoofs, and the silent night was filled with curses. I never knew what it was that I had passed or how close I had come to it, but there were certainly a scared horse and a mad driver. They were past in an instant.

Finally I saw some lights ahead, and remembered a place where the road was being repaired. I seemed to be standing still while those lights came ever nearer, and I was somewhat startled to find how rapidly they came on. Thinking of a hill and sharp turn ahead, I decided to walk the remainder of the distance. Coming to a fence I felt my way along. When I came to the bridge crossing the Connecticut River I remounted and rode on.

Just as I was coming into Sunderland I ran off the road and leaped off. No harm was done and I walked my machine to the hotel, where I left it for the night, and returned by car. The next day I ran it in from Sunderland in twenty-five minutes. My cyclometer registered 46 miles.

My friend, after pushing his machine for a while, slipped the belt and pedaled into South Deerfield, where he left his wheel with a blacksmith.

It will be some time before I take another *short* ride without a lantern.

A census of horses in Paris taken up at the beginning of the present year is said to have shown them to number 90,926. At the beginning of 1902 there were still 91,776, and at the beginning of 1901, 96,868.

At a dinner given in Berlin in connection with the opening of the automobile exhibition there Prince Henry of Prussia made a speech in which he referred to the unpopularity of automobilists, and said this was partly due to the envy of people who were unable to buy such costly vehicles and partly on account of the conduct of the automobilists themselves. The Prince added: "Gentlemen, have a placard fastened on your automobiles with the inscription, 'Love Thy Neighbor as Thyself,' and above all act in accordance therewith when on one of the public highways."

In a recent lecture on motor bicycles Mervyn O'Gorman said that in his experience with these machines was as follows: "As delivered by the maker the machine runs, but not forever. You must first pass through the overhauling stage or trouble era. This 'trouble stage' either makes or mars the machine; in fact, if you remedy every fault in such a way that it cannot recur, it doesn't recur, and after 500 miles you have almost doubled the original value of the machine, and thereafter it will never seriously delay you."

The Introduction of American Automobiles into Switzerland.

United States Consul H. L. Washington, at Geneva, reports on the above subject in part as follows, under date of February 20:

The sale of automobiles is growing fast in Switzerland, especially in the cantons of Geneva and Vaud. The canton of Valais, the third canton of this consular district, has but one road accessible (by law) to motor cars. Geneva, especially, has, in comparison with the cantonal population (135,000), a large number of these modern vehicles (about 280), and is far ahead of all the other cantons of Switzerland. There are also many motor cycles, and it is estimated that during the coming tourist season the total number of automobiles will be increased to about 400. Benzine (gasoline) is comparatively low in price, costing 24 francs per 100 litres (about 18 cents a gallon).

The most popular machines seem to be those of from 6 to 8 horse power, and among them is the 6 horse power French "Voiturette de Dion-Bouton," with two seats, which is sold here at a little under 4,100 francs ($791.30). The firm Perrot, Duval & Co., Geneva, have already disposed of quite a number of these vehicles. Most of the motor cars in Geneva are French; they compare with German makes as 4 to 1.

Under the existing Swiss tariff carriages of all kinds pay a duty of 20 francs per quintal ($3.86 per 220 pounds); but if the weight of the motor car itself, separate from the total weight of the vehicle, can be stated at the time of importation and proved by a certificate from the builder, the duty on it is assessed at 4 francs (77 cents) per quintal (220 pounds), the remainder of the total weight paying 20 francs per quintal ($3.86 per 220 pounds). It can be safely stated that 100 to 150 or 200 francs ($19.30 to $28.95, or $38.60) will cover the duty.

Motor cycles are assessed at 70 francs per quintal ($13.51 per 220 pounds). The general tariff, which is applied to American goods, raises this figure to 100 francs ($19.30).

The new tariff bill passed by the Federal Chambers at the end of last year, which will be submitted to the nation on March 15 next, increases the rate of duty on automobiles from 4 and 20 francs (77 cents and $3.86) to 40 francs ($7.72) net, provided the imported article is not upholstered, and if upholstered, to 60 francs ($11.58) per quintal (220 pounds). This means on a non-upholstered automobile weighing 600 kilograms (1,320 pounds) a duty of 240 francs ($46.32), and on the upholstered, of 360 francs ($69.50).

The pending tariff will probably not become effective before the beginning of 1904, if accepted by the nation; but the Federal Council has the power to fix the date.

The taxation of automobiles differs in the various cantons. For instance, the canton of Geneva taxes automobiles, under the head of "vehicles with one horse," 12 francs ($2.31) per year, and adds to this a charge of 5 francs (96 cents) for a cantonal plate number. The neighboring canton of Vaud imposes a yearly tax of 80 francs ($15.44) on a 6 horse power automobile; but each town or village of that canton also has the legal right to tax the same article, and one village levied double the amount of the cantonal tax—i. e., 160 francs ($30.88)—which made a total yearly tax of 240 francs ($46.32). The two owners of automobiles in that village sold their machines immediately.

The right to travel in automobiles through the country is another pending question which will be definitely settled in the near future. The Swiss Touring Club and the Automobile Club, both of Geneva, have long been advocating a general meeting of delegates from the different cantons, with a view to securing uniformity in the regulation for cycles and automobiles. The meeting finally took place in Berne December 19, 1902, and the bill now before the authorities will supersede the different cantonal regulations which now perplex and hinder the tourist.

Following is an abstract of the bill:

Each proprietor of an automobile must possess a cantonal card of identity, which shall contain his photograph. The capacity of the machine and the aptitude of the driver will be carefully examined into prior to issuing the card. Each machine must have two cantonal number plates, one in front and one in the rear. The alarm signal must be a low toned horn. Two independent brakes will be required; also a green lantern on the links, a white one on the right side and a red one in the rear. A maximum speed of 30 kilometres (18 4-5 miles) will be permitted, but in towns, villages and on mountain roads this speed is reduced to 10 kilometres (6 1-5 miles) per hour, and on bridges, sharp angles and steep roads and in narrow passageways 16 kilometres (3¾ miles).

Foreign tourists will be exempted from taxation and cantonal number plates, provided they are bearers of a permit from the authorities of their own country, and that reciprocity with that country exists.

It was hoped that all cantons would accept the bill, but the canton of Grisons, which is the most montainous and in which automobiles are strictly forbidden, proves reluctant. It is also feared that the canton of Valais will continue to restrict motor cars to the one road through the Rhone Valley to Brigue.

The only manufacturer of automobiles in German Switzerland is the firm of Martini, at Frauenfeld, canton of Thurgovia. This company, however, is about to start a sub-factory in French Switzerland, in which will be constructed the Rochet & Schneider chassis.

The firms dealing in automobiles in Geneva are: Perrot, Duval & Co., 5 Rue General Dufour; Garage des Eaux-V Rue Muzy; F. Panchaud, 2 Quai P Fatio; Dufaux frères, Quai du M Blanc; E. Kubler, Rue de la Cloche Roesch, 19 Avenue du Mail; Megr Bocquet, 10 Boulevard James Fazy Jacot, 27 Boulevard du Pont d'Arve Souvairan & Co., 41 Rue des Abattoi

Municipal Motor Wagons.

(CONCLUDED.)

Each cylinder of a double acting s engine gives two driving impulses revolution, as compared with one im in two revolutions of a gasoline en the driving effort is therefore more form, and the flywheel need not b heavy. The transmission gear of the s engine is simpler than that of the gas engine. Running backward is effecte simply moving the reversing lever, in the gasoline engine a special tra toothed wheels and clutch is required

On the other hand, the absence boiler and the substitution therefor carburetor or vaporizer, is an impo point in favor of the internal combu engine, especially when the tare weig the vehicle must be kept low. For distance running the necessity of stop to take up water is a serious item ag the steam engine; but for municipal ice, where the radius of action is paratively small, this objection is les portant. For heavy goods traffic over distances it is quite conceivable that a years may see the relative positions o steam engine and the internal combu engine reversed; but even then the s engine is likely to hold its own in mun work.

The evolution of a satisfactory air c condenser may weigh down the ba still further in favor of the steam en but up to the present, for heavy stea hicles, condensers have not been very cessful in practice.

Trade Literature Received.

The Art of Laughing at Motor Trou —Catalogue of Ignition Parts of Auto-Marine Electrical Company, of kins, N. Y.

Goodson Igniter and Spark Pl Goodson Electric Ignition Compan Providence, R. I.

Oil Burners and Equipment.—The tional Oil Burner and Equipment pany, of St. Louis.

Argyll Motor Cars.—Hozier Engi ing Company, Limited, Hozier s Bridgeton, Glasgow, Scotland.

Baker Automatic Funnel.—Willia Baker, 143 Liberty street, New Yor

Simplex and Multiplex Lubricat The Automatic Lubricator Compan 334 Dearborn street, Chicago.

Ostergren Fuel Oil Engines.—The Oil Power Company, 60 Wall street, York.

COMMUNICATIONS.

Non-Freezing Solutions.

Editor HORSELESS AGE:

I have been much interested in the very able and studious paper upon "Experiments with Non-Freezing Liquids" by E. Mallinckrodt, Jr., in the last number of THE HORSELESS AGE, and especially in the statements made in regard to the corrosive power of calcium chloride, the use of which salt was first suggested by the writer in these columns.

It is impossible to doubt the correctness of the experimental results obtained by Mr. Mallinckrodt, but the extensive successful use of calcium chloride may perhaps indicate that the experimental conditions realized by him are more favorable to corrosive action than those which exist in practice. The contacts between dissimilar metals which are actually met with in an automobile are not so ideally favorable to corrosive action as Mr. Mallinckrodt's "carefully cleaned" strips of metal. The whole inside of the engine jacket is in practice encrusted with rust, and the tanks, radiators and connecting pipes are generally internally coated with a slime from the large quantities of more or less impure water which has been evaporated. The conditions are not favorable for corrosion, as no clean surfaces are exposed to the action of the solution, and while there is doubtless a certain loss of weight due to the action of ordinary water upon the metals, it is problematical how much, if any, this loss is increased by the use of a proper quality of calcium chloride.

If any user of calcium chloride solution finds that his tanks are being affected by the liquid I think it will be found that the following expedient will prove effective: Attach to the filling plug of the water tank a battery zinc of the Leclanché type, which is in the form of a rod. When the plug is in place this rod will extend downward into the solution, and as zinc is more electro positive than any other metal present the galvanic action, if any exists, will be concentrated upon it and the tank will be protected. This is an old expedient which has been resorted to for the purpose of protecting metal ships from the action of salt water.

The solution of potassium carbonate and glycerine which is suggested as a substitute for calcium chloride should be a very good liquid for the purpose, judging from Mr. Mallinckrodt's statements, but must, however, be much more expensive than the calcium solution, as potassium carbonate costs at least five times as much per pound as calcium chloride. It is unfortunately true that potassium carbonate has a most destructive action upon animal and vegetable matter. Its solution is nothing more or less than lye. Possibly this fact may prove an objection to its general use.

It would be interesting to know whether anyone has made any experiments with magnesium chloride, which is a cheap and highly soluble salt and one which should not prove destructive of metals.

Perhaps Mr. Mallinckrodt has made some experiments with this salt or will do so and report results.

ALBERT L. CLOUGH.

Non-Freezing Solutions—Corrections.

Editor HORSELESS AGE:

I beg to call your attention to an error in the manuscript I sent you, which is the writing of the word "loss" for "gain." Thus in experiment 1 the weight of copper before corrosion is 10.425 grains, the weight of the copper after corrosion is 10.429 grains; so far the printed matter is correct, but in the next line you have loss .04 per cent.; this should be gain .04 per cent.

Also, the freezing point of a solution of 50 grains of carbonate of potash in 100 grains of water was above 2° below zero, not 2° Fahr., as you have written it. The remainder of the article is correct.

In the following article on "Compression in Gasoline Engines" I note that the law "that with a perfect gas pressure and volume vary in inverse proportions," temperature remaining constant, is attributed to Gay Lussac. This law was not discovered by Gay Lussac, and is not the one commonly known as Gay Lussac's law. The inverse proportionality of pressure and volume of any given amount of a perfect gas under constant temperature was discovered by Robert Boyle about the middle of the seventeenth century, and is known as Boyle's law. The so called "Gay Lussac's law" expresses the fact that a given volume of all gases under constant pressure expands 1-273 part of their volume at 0° C. when raised from 0° C. to 1° C. As a matter of fact Gay Lussac was not the first one to publish this law, although it is generally credited to him, John Dalton having published it several years previous, at the beginning of the nineteenth century.

E. MALLINCKRODT, JR.

Storage Charges.

READING, Pa., March 13.

Editor HORSELESS AGE:

Permit me to protest through your columns against the practice of overcharging us unfortunate individuals who happen to drive automobiles, for the privilege of stabling a vehicle over night. A customer recently remarked that he frequently left his vehicle around the corner while he walked around to the livery stable office and arranged to store a carriage over night for a quarter, after which he would go back and bring the automobile, only to be met with a storm of protest and a demand for $1, which sometimes resulted in a satisfactory compromise. Such a condition of affairs should not exist and should not be necessary, and if automobile drivers will but refuse to be imposed upon this condition will soon cease. Several examples will illustrate the unjustness of these charges.

During the Reliability Run I drove up to a livery stable at New Haven and asked the price of stabling for the night, and on being told $1, simply drove farther. At the next stable I was assured that it would be 25 or 50 cents and told them I had no objection to paying the latter. Next morning, however, I was met with a demand for $1, but paid 50 cents and pushed the vehicle outside. While oiling up the proprietor appeared and stated that his man had been in error and that $1 was the customary price, which he must have. I as positively assured him that I had contracted for storage at a price not to exceed 50 cents, that I had paid the 50 cents and would pay no more; that I did not propose to be beat in that manner. He replied, "What! own an automobile and won't pay a dollar"? I assured him that the ownership of the automobile had nothing to do with it. I would not be imposed upon and did not have to stay over night in his town anyhow. Seeing that ridicule wouldn't work, he abandoned his position and nothing more was said. On the return trip storage was made at a small automobile station on Whitney avenue, where proper treatment was received.

Coming into Trenton, N. J., about 11 o'clock one night, we stopped at a hotel across the street from the Pennsylvania Railroad station, and because of the lateness of the hour did not make any terms as to the charge of the vehicle. Next morning we left before breakfast and found a charge of $1 to be paid for the use of a little space behind the horses. On protest this was reduced to 50 cents. I got the vehicle ready, while my companion came down more at his leisure and met me at the door a few minutes later. We started and he opened conversation by asking what I paid for my room. I replied, "One dollar," when he stated that he had been compelled to pay $1.50, so in this case the proprietor resorted to trickery in order to get that $1 for storing that three wheeled carriage. This may be considered profitable from the hotel man's point of view, but such treatment has made two men that will stay out over night rather than patronize that place a second time. A light motor vehicle of the gasoline variety free from leaks or open flame of any kind is just as safe in a stable, takes less room and makes no more trouble than a horse carriage. Since one of the latter without horses can be stored readily anywhere for 25 cents, twice that sum is certainly ample for a motor vehicle. If such care as washing is needed, a further charge would not be exorbitant.

This subject may seem of little importance, but since many people are anxiously striving to afford an automobile, it is to the

interest of all manufacturers and users to keep down such unjust expense as this in order that the number of automobile users may be increased. CHAS. E. DURYEA.

Steam Trucks in Winter.

Editor HORSELESS AGE:

On page 354 of THE HORSELESS AGE of March 11 appears a report of some remarks by Mr. Birdsall before the Automobile Club of America. It is rather refreshing to hear from the gentleman that "in this latitude steam is not a very suitable power, as the piping is liable to freeze up." With all due regard for the sincerity of Mr. Birdsall's belief, it seems a pity that he should, as an engineer, make such a sweeping assertion. We have kept close track of Mr. Birdsall's experiments with a steam truck, and we therefore do not feel surprised that he gave it up as a bad job. The piping on this truck was so poorly arranged and exposed that it would have been little short of a wonder had he been able to keep it from freezing. Fortunately, steam is so powerful and yet elastic that Mr. Birdsall's conclusion will not prove its deathblow; otherwise we should be pleased to come to its aid by stating that a truck of our system now operated by the Adams Express Company was found to be perfectly immune from the effects of cold during the last winter, and that in future the trucks built by the American Steam Wagon Company will dispense with the piping altogether save for short steam connections.

AMERICAN STEAM WAGON CO.
B. E. Renbery.

The Proposed State Organization of Clubs.

SYRACUSE, N. Y., March 9.

Editor HORSELESS AGE:

I am sending you today, under separate cover, a copy of Saturday morning's *Post-Standard*, and call your attention to the article on page 3, headed "A State Body of Auto Clubs." You no doubt will recall that this matter was talked of considerably last fall, and owing to the fact that a great many officers of the different clubs of the State were away from home, and many of them were very busily engaged in the industry, it was decided to withhold action until this time; and you will see from the account that a committee has been appointed by the president, T. D. Wilkin, of our club, of which Hurlburt W. Smith is made chairman, the other members of the committee, Willet L. Brown and Frederick H. Elliott, of this city, also being members.

It is our desire to call a meeting for the purpose of forming a permanent organization, and Mr. Smith, who is the first vice president of this club, will be our candidate for president of the association for the first year. He is one of the most enthusiastic automobilists in the State, his reputation being world wide, through his connection with the Smith Premier Typewriter Company, of this city. He has the reputation of being one of the brightest young men in the manufacturing business today, and as a promoter he would be the ideal candidate to promote the State Association and get it running on a big basis.

I shall be very glad to have you comment favorably upon this idea, as I believe you have heretofore, for you appreciate that this will be a great help to all those interested in the automobile business from every standpoint, and would promote the varied interests to a great extent. The clubs would be united, the members becoming known to each other socially, and for the advancement of the "good roads" interest, and securing legislation favorable to automobilists in general at Albany, the formation of the association will certainly be of great benefit.

FREDERICK H. ELLIOTT,
Secretary-Treasurer.

Explosive Engine Queries.

Editor HORSELESS AGE:

Please answer in your next issue the following:

If a gas engine is constructed so as to operate perfectly, and for convenience it is thought best to add an attachment which will communicate with the explosion chamber during the explosion, increasing its original capacity about four or five cubic inches, will said enlargement of explosion chamber reduce the power of the engine? If so, would it be perceptible?

DR. C. R. PONTIUS.

[When the compression space is increased in size by an additional chamber the compression is reduced, and with it the power. However, four or five cubic inches would make so little difference in the compression of the ordinary carriage motor, with 4½x6 inch or larger cylinder, that the difference in power would not be appreciable.—ED.]

The Auxiliary Spark Gap Discovery.

SYRACUSE, N. Y., March 10.

Editor HORSELESS AGE:

We notice that considerable space is being devoted in the automobile papers to the so called new discovery, that an auxiliary gap in the high tension circuit will tend to produce a spark in the cylinder where it would under ordinary conditions not spark, due to fouling. We would say that we have been cognizant of this phenomenon for some four years, and have used it quite generally to clean off sooty spark plugs without removing them, simply by disconnecting the wire and holding it a short distance away from the end of the plug. We would also say that we know several other engineers and electricians who have had experience with gas engines, who also are aware of this fact, and we always supposed it was a phenomenon of general knowledge. We are therefore much surprised to see it exploited as a new discovery. It is very doubtful whether it is of any practical benefit to an automobile builder, in so much as with a weak current a plug that would continue to spark an engine would with the auxiliary gap fail to do so, and we know of nothing that is more likely to occur than a weak current.

H. H. FRANKLIN MFG. COMPANY,
John Wilkinson.

That Mysterious Fire.

Editor HORSELESS AGE:

Referring to the communication of L. S. Thompson in regard to a mysterious fire, if there had been a slight leak about the gasoline pipe which runs under the boiler, a flame so small as to be unnoticed would continue to burn at that point after the burner was shut off, and would ignite any stray gas which might be wandering about later on. I have often thought that this might occur in those steam carriages in which this piping is made up with screwed fittings, the joints of which have to be kept tight with great difficulty.

CHAS. E. HYDE.

Some Weak Points of the Automobile Business.

Editor HORSELESS AGE:

While at the New York Show I was particularly impressed with the nerve of the newer manufacturers in putting out machines on the same general lines as some of the older makers and asking the same or even a higher price for their products. This may catch the buyer who is unacquainted, but even now that class are consulting their more experienced friends.

Another point I noticed was the adherence of so many manufacturers to ball bearings instead of adopting the more rational roller bearing. There is not a ball bearing made that will not cut a groove sooner or later—usually much "sooner" than the owner is led to anticipate when buying. I have had my experience and will never buy another machine with ball bearings. Ball bearing engines are the greatest nuisance imaginable, and ball bearings in axles are even worse.

I saw machines there which were called 16 horse power, which under no circumstance will or ever have, in actual practice, developed more than 8 horse power. I have several friends who have purchased machines which were misrepresented by both catalogues.

Another bad feature of the automobile business: An owner discovers a serious defect in his machine and writes the manufacturer about it, and in reply receives a letter stating: "We are very sorry about the matter and are now making the part much better and will be pleased to replace the part for $——."

This may be automobile business, but is it business? JOHN A. HAWKINS.

[We do not see that any of the points raised by our correspondent have very much weight. Two machines may resem-

ble each other as regards the general lines and yet one may have been much more expensive to build, owing to better material and workmanship. That the price is higher in the case of one machine is, of course, no proof positive that it embodies better material and workmanship.

Ball bearings, particularly on engine cranks, have been the source of much trouble, but on the other hand they are used exclusively on the transmission shafts of the latest style of Mercedes machine, which proves that they are not regarded as entirely unsuitable for automobiles by leading makers. When properly adjusted they certainly run with less friction than any other form of bearing.

As to making good defects found in vehicles, the manufacturer could not possibly be expected to make free of charge any improvements the customer may deem desirable. The term "defect" is too indefinite, as it might either be taken to be anything interfering with the running of the car, or, again, anything capable of improvement. If the latter definition is adopted, we venture to say there is not a car on the market without defects; that is, in a year or two improvements will have been introduced which the car does not possess. The manufacturer cannot be expected to keep the car up to date and add all current improvements free of charge.—Ed.]

The Buffalo Automobile Show.

The local Automobile Show in Buffalo was opened at the City Convention Hall on Monday evening, March 9, at 8 o'clock. The hall was handsomely decorated and the Sixty-fifth Regiment Band gave concerts every day, which added to the attractions of the Show. Practically all the leading makes of automobiles were represented by exhibits made by Buffalo agents and by manufacturers located in Buffalo. A number of new vehicles were also shown for the first time, including the Eckhardt & Souter, a 25 horse power tonneau propelled by a two cylinder, two cycle engine and equipped with a transmission gear giving three forward speeds and one reverse. The car is very substantially built and is equipped with wood wheels with sixteen spokes. The axles are 1¾ inches in diameter and fitted with plain bronze bushed bearings. Side chain drive is employed. The car weighs complete 2,400 pounds. It was designed and built by John Eckhardt and will be manufactured by the Eckhardt & Souter Automobile Company, 288 Triangle street, Buffalo.

Another new firm exhibiting was the Morlock Automobile Manufacturing Company, the successors to the Spaulding Automobile Company. They have offices at 394 Ellicott square, Buffalo, and will manufacture a 6½ horse power single cylinder gasoline car.

The Ripper Motor Carriage Company, of Buffalo, exhibited a light runabout with a reachless running gear, 28 inch wire wheels, 2½ inch tires and a single cylinder horizontal motor in front. The wheel base is 64 inches and the track 45 inches. The transmission gear gives two forward speeds and is operated by individual clutches, the gears remaining constantly in mesh.

Following is a list of the exhibitors, as issued by the management:

Haynes-Apperson Co., Kokomo, Ind., Buffalo Automobile Exchange.
Winton Motor Carriage Company, Cleveland, Ohio, W. C. Jaynes, agent.
Olds Motor Works, Detroit, Mich., W. C. Jaynes, agent.
Columbia Motor Vehicle Agency, Buffalo, W. S. Bull, manager.
Jones-Corbin Company, Philadelphia, Pa., Columbia Motor Vehicle Agency.
Ward Leonard Electric Company, Bronxville, N. Y., Columbia Motor Vehicle Agency.
Morlock Automobile Mfg. Co., Buffalo.
General Automobile Company, Cleveland, Ohio, A. J. Wells, agent.
Buffalo Tire and Rubber Company, Buffalo.
Autocar Company, Ardmore, Pa., C. W. Roe, agent.
Baker Motor Vehicle Company, Cleveland, Ohio, C. W. Roe, agent.
Northern Automobile Company, Detroit, Mich, C. W. Roe, agent.
Packard Motor Car Company, Warren, Ohio, C. W. Roe, agent.
National Electric Vehicle Company, Indianapolis, Ind.
Shaeffer, Bunce & Co., Lockport, N. Y.
E. R. Thomas Motor Company, Buffalo.
H. H. Franklin Manufacturing Company, Syracuse, N. Y.
National Battery Company, Buffalo.
T. B. Jeffrey & Co., Kenosha, Wis., Rambler, D. H. Lewis, agent.
Fisk Rubber Company, Chicopee Falls, Mass.
Class Journal Company, New York.
O. K. Machine Company, Buffalo.
Hussey Automobile and Sundry Company, Detroit, Mich.
Ripper Motor Carriage Company, Buffalo.
National Carbon Company, Cleveland, Ohio.
Buffalo Electric Carriage Company, Buffalo.
Buffalo Gasolene Motor Company, Buffalo.
Diamond Rubber Company, Akron, Ohio.
Twentieth Century Lamp Company, New York.
Conrad Motor Carriage Co., Buffalo.
Foster Automobile Mfg. Company, Rochester, N. Y.
Prescott Automobile Manufacturing Company, Passaic, N. J.
Knox Automobile Company, Springfield, Mass., Gibson T. Howard, agent.
Cadillac Automobile Company, Detroit, Mich., Centaur Motor Vehicle Company, agents.
International Motor Car Company, Waverley, Indianapolis, Cleveland, Ohio.
Centaur Motor Vehicle Company, Buffalo, Centaur Motor Vehicle Company, agts.
Western Union Telegraph Company.
Pierce Motor Vehicle Company, Bound Brook, N. J.
Kirk Manufacturing Company, Toledo, Ohio, Centaur Motor Vehicle Co., agts.
International Motor Car Company, Toledo, Centaur Motor Vehicle Company, agents.
American Motor Carriage Company, Cleveland, Ohio, Centaur Motor Vehicle Company, agents.
Searchmont Motor Vehicle Company, Philadelphia, Pa., Centaur Motor Vehicle Company, agents.
Eckhardt & Souter, Buffalo.
The Horseless Age, New York.
Standard Anti-Friction Equipment Company, New York.
Truscott Boat Company, St. Joseph, Mich., F. W. Sherman, agent.

Rules of the Paris-Madrid Tourists' Excursion.

In connection with the Paris-Madrid Race, which will take place from May 24 to 27, on the route Paris-Saint-Sebastien-Madrid, there is being organized, under the auspices of the Automobile Club of France and the Royal Automobile Club of Spain, a collective touring excursion with an itinerary specified further on.

There will be admitted to this excursion only pleasure or touring vehicles driven, piloted or accompanied by a member of the Automobile Club of France or by a member of its corresponding clubs, in the name of which the vehicle must be entered. Entries will be received until April 30, against an entry fee of 200 francs per vehicle, by the secretary of the Automobile Club of France and the secretary of the Royal Automobile Club of Spain. The entry fee must be paid at the time the vehicle is entered and remains the property of the organizers even if the vehicles entered do not take part in the excursion.

The excursion will be held in daily stages, from May 14 to May 26, over the following itinerary:

In France—First day, Paris to Pougues; second day, Pougues to Royat; third day, Royat, Viaduct of Garabit, Murat, Vic sur Cére; fourth day, Vic sur Cére to Alvignac; fifth day, Alvignac to Agen; sixth day, Algen to Saint-Sebastien; seventh day, rest. In Spain—First day, Saint-Sebastien to Bilbao; second day, Bilbao to Vittoria; third day, Vittoria to Burgos; fourth day, Burgos to Valladolid; fifth day, Valladolid to Salamanca; sixth day, Salamanca to Madrid.

The itinerary is obligatory, but the daily stages as indicated above are not absolutely obligatory; that is to say, each of the participants is at liberty to stop and end a stage at any point of the itinerary convenient to him, either before or beyond the terminal provided for each daily stage. Nevertheless, owing to the requirements of the organization, and with a view to preserving the collective character of the ex-

cursion, the stages from Saint-Sebastien to Madrid are obligatory.

START.

The start from Paris will take place on May 14 at the option of the participants. The starting certificates will be issued at the club house of the A. C. F. The start in each of the following stages will also be entirely free and unrestricted. The starting certificates will be issued for each stage from 7 o'clock a. m. till noon. The start from Saint-Sebastien must take place on May 21.

CONTROLS.

In order that the competing vehicles may be recognized and controlled, each one of the excursionists will be furnished with a special arm band and each vehicle with a pennon; the driver of each vehicle will be furnished with a road book in which are stated in succession the dates of passage, of starts and arrivals, the names of the different cities of the daily stages, and the frontier. To this end a control will be organized and an operation in each city forming a terminal of a stage, and at the frontier. Outside of these controls there will be no controls along the route. The itinerary adopted will be indicated in a booklet, issued gratuitously to the participants, which contains a list of the principal towns to be traversed, the distances between these and a general plan of the route. The most difficult places of the route will be demarcated by triangular signs, the point of which shows the direction to be followed, but as the excursion takes place at the ordinary speeds and does not, in consequence, require any of the measures necessitated by a race, each participant must determine for himself the degree of practicability of the route and must regulate his pace in accordance with the difficulties that may present themselves.

The operators of the vehicles taking part in the excursion must conform absolutely to the laws and local regulations governing the use of automobiles in France and Spain, and this as much as regards the documents and permits required as the speed limits to be observed. They must particularly slow down to a very moderate gait in built up sections, villages and towns, as well as at curves, crossings and difficult, narrow or obstructed passages; slow down or, if necessary, stop each time that horses or other frightened animals are likely to cause an accident, and conform to the instructions and injunctions of the local police. The tariff formalities at the passage of the frontier must be looked to by the proprietors of the vehicles. The organizing clubs, however, will confer with the interested administrations to secure a simplification of these formalities, and further instrustions on this subject will inform the participants what course to pursue in this respect.

Supplies of fuel, oil, electrical energy, tires and spare parts, as well as storage and lodging accommodation, must be provided by each of the participants individually, and every latitude is allowed them in this respect. The organizing clubs confine themselves to indicating to the supply dealers along the route the number of vehicles entered by April 30, without, however, taking the initiative in passing the orders to them. Any repairs are permitted, both on the road and at the controls.

AWARDS.

A certificate of participation and a silver gilt commemorative medal will be given to each of the owners of the vehicles who have made the run from Paris to Madrid over the itinerary indicated above and under the conditions stated. A silver medal and a certificate will be given to each of the owners of vehicles who have made the run from Saint Sebastien to Madrid. In addition, medals, prizes or pieces of art, which may be offered by associations, cities or private parties, may be awarded to the vehicles which the commission may consider as best satisfying certain conditions indicated by the donators.

EXCURSION INTO ANDALUSIA.

Following upon the excursion from Paris to Madrid a touring excursion into Andalusia will be held. This excursion, in which the French and foreign participants in the Paris-Madrid tourists' excursion and the participants in the Paris-Madrid race will participate, will take place after the arrival of the racing vehicles in Madrid.

The Boston Dealers' Show.

The first show of the Boston Automobile Dealers' Association opened in Symphony Hall on Monday evening, March 16, at 8 p. m. The crowds which filled the hall showed a lively interest in the cars exhibited. All the latest models of cars represented in Boston were shown, including American and foreign makes. There will be no indoor performances at this show, which will be conducted along the same lines as the show at New York, the idea being to bring before the public the latest models and explain their good points. Demonstration cars with experienced operators are in waiting outside the building. The building and the individual stands are very tasefully decorated according to a uniform color scheme of green and gold. The Winton Company exhibits a chassis over a mirror, while a Knox chassis is set upright on end. Many of the exhibits are identical with exhibits at the New York Show. A machine new to Boston is the Pierce Arrow. The De Dion "Populaire" attracted much attention, being claimed to be constructed with a special view to adapting it to ladies' use. There are in all about fifty exhibitors, showing over 200 cars. Following is a list of the exhibitors:

American Cycle Manufacturing Company—Toledo, Waverley, Cadillac, Clipper, Columbia, Rambler, Hartford, Clement motor cycle attachment.
Automobile headquarters—Pierce.
American Coil Company—Electric supplies.
American Darracq Auto Company—Darracq cars.
Auto and Motor Cycle Company—I Motor Cycle, Merkel Motor Corson Special Motor Tandem.
Automotor Company—The Autom
Bates Brothers—St. Louis, Conrad, as, Mobile, Kensington, suppli
Bean-Chamberlain Manufacturing pany—Hudson cycles.
Bliss, Edward N.—Supplies.
Buffum, H. H.—The Buffum.
Bangs, A. R.—Franklin.
Crompton Motor Carriage V Crompton cars.
Coburn & Co., A. J.—Crestmobile monwealth cars.
Columbus Auto Exchange—Rambl
Drisko, Snow & Ross, Inc.—A Reeber.
Diamond Rubber Company—D tires.
Eclipse Auto Company—Eclipse ca
Electric Storage Battery Company age batteries.
Fuller, A. T.—Northern, Orient Cycles.
Fosdick, Harry—Winton.
Field, W. H., Frictionless Roller Company—Roller bearings.
Gray & Davis—Lamps.
Ideal Plating Company—Plating w
Jones-Corbin Company — Jones cars.
Keasby & Mattison Company—A automobile houses.
Lowe, George H.—White steam c
Lozier Motor Company—Lozier e
Marvel, H. E.—Columbia electric, bia gasoline.
Morrison, A. E.—Peerless, Baker
MacAlman, J. H.—Locomobiles.
Pope-Robinson Company—Pope-R cars.
Prescott Automobile Company—I steam cars.
Randall, F. E.—Stevens-Duryea, Motor Cycle.
Reed-Underhill Company—Knox c
Read, F. J.—Yale.
Racine Boat Manufacturing Con Racine boats and launches.
Renault Car Company—Renault ca
Skinner, Kenneth A.—De Dion-cars.
Shattuck & Son—Autocar, Olds Packard, Searchmont.
Stanley F. E. & F. O.—Stanley carriage.
Shuman & Co., A.—Clothing.
Smith, Edwin L.—I. M. C. steering
Smith, Mortimer F.—Orient.
Saylor, F. G.—Tires.
Standard Anti-Friction Equipment pany—Tires.
Twentieth Century Manufacturing pany—Lamps.
THE HORSELESS AGE.
Upton Machine Company—Upton
Waltham Auto Company—Waltham
Whitten, Charles E.—Stanley stea riages.
Westinghouse Company's Publishi partment—Storage outfits, mot

NEW VEHICLES AND PARTS.

The Searchmont Type VII.

About a year ago the Searchmont Motor Company, which later became the Fournier-Searchmont Automobile Company, and more recently the Searchmont Automobile Company, made a complete change in the design of their gasoline cars, bringing out a machine designed entirely on French lines, with upright motor in front, shifting gear transmission, etc. Cars of this type made excellent records in the last Long Island 100 mile contest, the A. C. A. 100 mile contest, and the New York-Boston and Return Contest, which various performances have placed the Searchmont among the leading makes on the American market today.

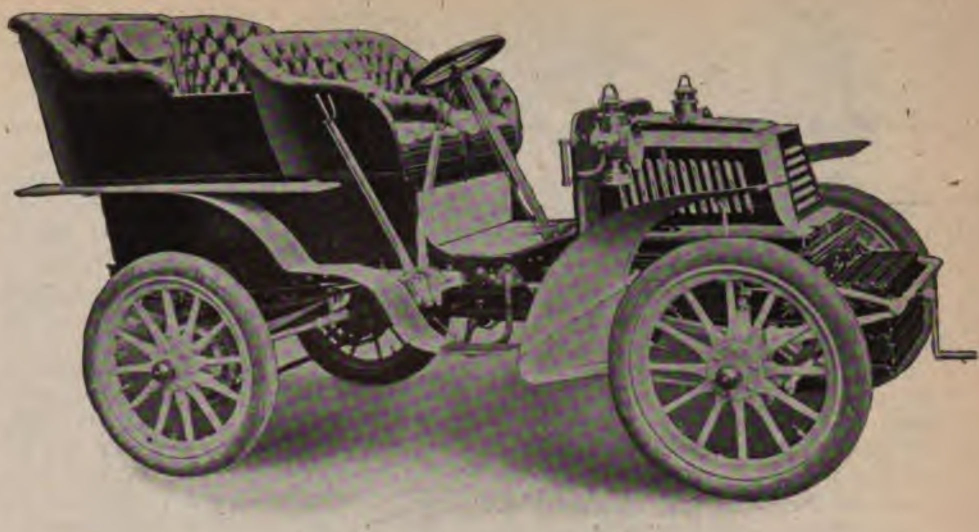


Fig. 1—Searchmont, Type VII.

The Searchmont Type VII, the latest product of the Searchmont Company, to which the accompanying illustrations refer, is a substantially built machine of medium power. The wheel base is 81 inches, and the tread standard. Wood wheels 32 inches in diameter are used; these have twelve spokes each, and are shod with 3½ inch clincher tires. The axle bearings are plain, bronze bushed. The axles are solid, the front axle being 1⅜ inches in diameter, and 1¾x1½ inches adjoining the knuckles, and the rear axle 1½ inches in diameter, and 1½x1¾ inches under the springs. The axles have centre parts of Norway iron and steel journals.

The frame is of armored wood, the longitudinal beams of the main frame consisting of ash beams 1½ inches wide by 2¾ inches high, reinforced by steel flitch plates 4 inches high by 3-16 inch thick. The engine and change gearing are supported by a false frame of 1½ inch angle iron.

The frame is supported by four semi-elliptic springs, the front springs being 36 inches long, 1¾ inches wide, and composed of six leaves, and the rear ones being 40 inches long, 2 inches wide, and composed of seven leaves.

THE MOTOR.

The motor is a two cylinder, vertical one, rated at 10 horse power. The cylinders are of 4½ inches bore and 5 inches stroke, and the normal speed is given at 800 R. P. M. The two cylinders are independent of each other and are bolted to a common crank case. The two crank pins are set at 180 degrees and the crank rests in three bearings.

A notable feature is the arrangement of the exhaust valve operating mechanism. The cam shaft is driven from the crank shaft by spur gears and is located in the crank chamber. The springs of the exhaust valves have their lower ends passing through a slot in the valve stem, instead of bearing against a washer, as is, perhaps, the more common form of construction in this country. The valves are operated through push rods provided at their lower ends with a fork, in which is journaled a cam roller. The push rods are arranged in special bronze housings, which are bolted to the crank casing on top, as is well shown in the detail illustration (Fig. 2) herewith. A spiral spring within this housing always keeps the cam roller in engagement with the cam. To remove the push rod it is only necessary to remove the nuts from the two studs holding the housing in place. The exhaust valves are made in a single piece of a special nickel alloy, which is said to be free from all scaling and warping.

The admission valves are located directly above the exhaust valves in dome shaped valve casings, with doubled flanged joints, for the valve chamber and the intake pipe respectively. Above the stem of the intake

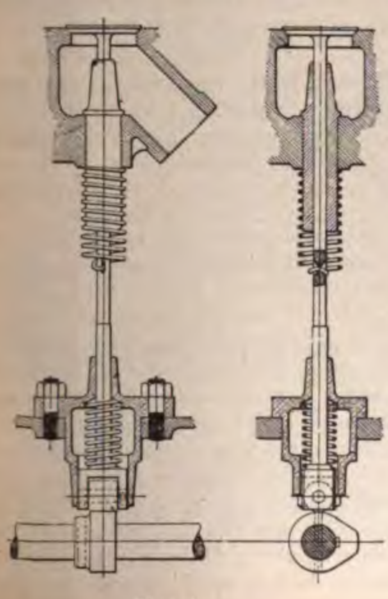


Fig. 2.

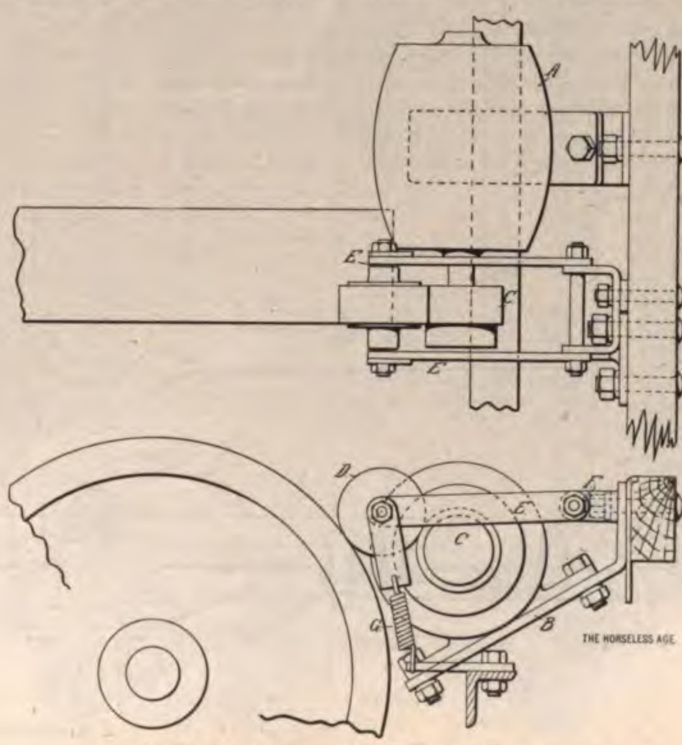


Fig. 3—Self Adjusting Dynamo Drive.

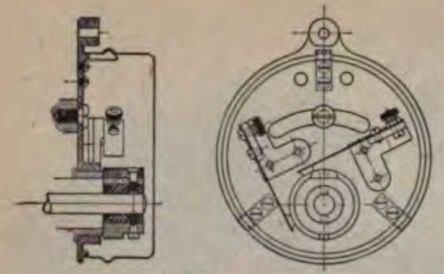


FIG. 4—COMMUTATOR.

valve is arranged a small rod protruding through the wall of the dome shaped casing and normally held out of contact with the intake valve stem by a coiled spring. By pressing on this rod, the valves can easily be loosened if they should have become gummed to the seat. The crank casing is made of aluminum, with four aluminum doors permitting easy access to all the enclosed parts. The connecting rods are made of forged steel and are fitted with phosphor bronze bearings, the bearings of the crank shaft also being of phosphor bronze. The cam shaft gears and the pump gears are enclosed within the engine casing. The motor complete, with its 16 inch flywheel, water pump, carburetor and piping, weighs 345 pounds.

IGNITION SYSTEM.

Jump spark ignition is employed, the current being furnished by a dynamo in ordinary operation and by a battery in starting, and if the dynamo should for any reason become inoperative. The dynamo is driven by friction, by means of a mechanism automatically compensating for wear, illustrated in Fig. 3. The dynamo A is supported upon a bracket B attached to the vehicle frame, adjacent to the flywheel of the engine, and is provided with a friction driving pulley C. An idler pulley D is journaled at the end of a pair of links E E, pivoted to a bracket F on the frame, and a strong coiled spring G draws this idler pulley into frictional engagement with both the engine flywheel and the dynamo pulley. It is, of course, obvious that any wear of the dynamo pulley or idler pulley is compensated for by the action of the spring. The change from dynamo to battery is made by means of a "throw over" switch attached to the dashboard of the car. All the wiring on the dash is covered with molding and the rest with rubber tubing.

The ignition plugs are of the usual type and are screwed into the lateral wall of the valve chamber between the valves. A separate coil is used for each cylinder, and the two coils are put up together in a wood box attached to the dashboard. These coils are fitted with magnetic buzzers. The commutator, Fig. 4 (marked vibrator in the plan), is located in front of the motor, and is protected with an aluminum cover, which can be easily removed when it is desired to examine the contact parts. The base of the commutator is of metal, of circular form, and is pivotedly supported concentric with the cam shaft. A slot is cut in this base concentric with the pivot support, and a bolt passing through this slot and into the crank case of the motor steadies the base when it is moved around its centre to advance or retard the spark. At the top the base is provided with a lug, from which connection is made to the spark timing handle and to the governor. The two brushes are arranged making an angle of 90 degrees with each other, the explosions in the two cylinders following each other in successive strokes, which are followed by two idle strokes. The spark is automatically advanced by a centrifugal governor, but can be controlled by hand by means of a small lever under the steering wheel.

A cut out switch for the spark circuit is arranged on one arm of the steering hand w as shown in Fig. 5. A strip of s metal is securely held by two passing through the arm or spoke o wheel, but insulated therefrom. Th posite end of the spring rests agai metal plug, insulatingly supported fro arm of the wheel, and against the ext end of the spring bears a button pa through the arm of the wheel. Nor the spring force of the sheet metal s holds it against the metal contact plu ferred to, and so establishes the ign circuit; but when the button is depr the spring is forced away from the co plug and ignition is interrupted. Whe car is left standing the plug is remove carried along, and it is then impossib start the engine. The button is locat the driver can easily operate it with thumb, while his hand grasps the ri the wheel. This switch is very conve for interrupting the ignition to retard speed of the car.

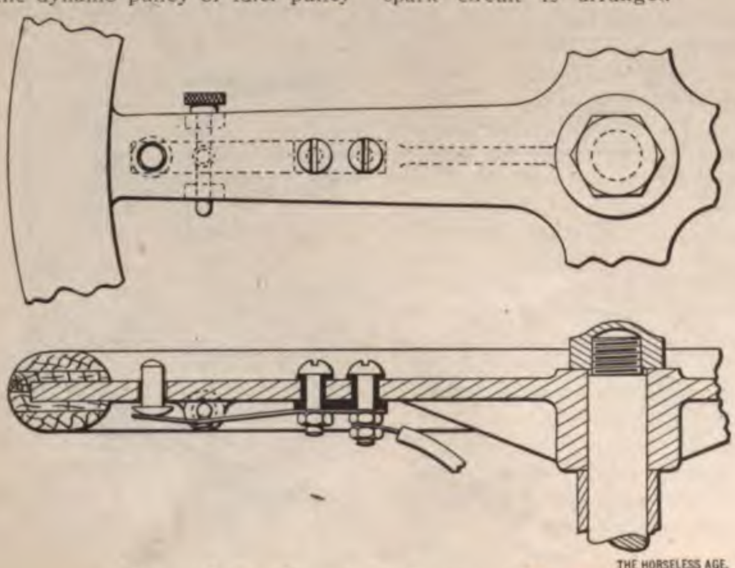


FIG. 5—SPARK SWITCH IN STEERING WHEEL.

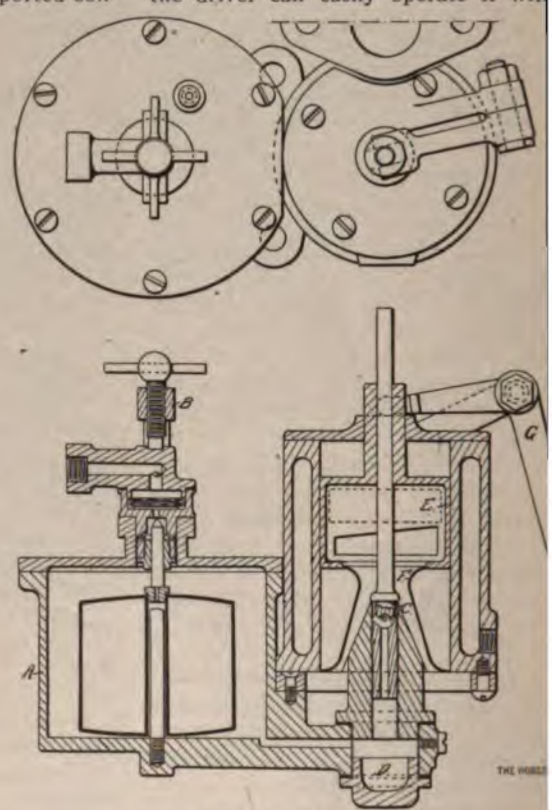


FIG. 6—CARBURETOR.

THE CARBURETOR.

The carburetor (Fig. 6) is of the known float feed, spraying type, and sesses a number of novel features whe it is claimed the mixture remains unv as the throttle is closed more or less b governor. The gasoline is fed to the chamber A on top the connection fitti the gasoline piping being secured in by means of a yoke B, which makes dis nection of the piping an easy matter. admission of gasoline being on top, float valve acts directly, without levers counterweights. At the bottom of the g line nozzle C is provided a well for di the gasoline to settle in. This well is i

form of an inverted screw cap D, and the sediment can be cleaned out by removing this cap. With the carburetor is combined the throttle valve, which consists of a hollow cylinder E capable of moving in an up and down direction in the chamber in which the nozzle is located. This hollow cylinder is provided with an opening in the side wall registering with a similar opening in the wall of the chamber, in which this hollow cylinder moves. The lower half of the hollow cylinder is provided with an opening and has attached to it a sheet metal hood F surrounding the spraying nozzle, this hood moving up and down with the hollow cylinder. The air is taken in through the bottom of this hood, and by reference to Fig. 5 it will be seen that when the hollow cylinder and the hood move upward the area of the air intake and of the throttled opening to the intake pipe increase simultaneously, which is claimed to result in maintaining the mixture constant. The bell crank G by means of which the throttle valve is operated connects to the centrifugal governor, as well shown in the plan of the vehicle. The same drawing also clearly illustrates the connection between the accelerator pedal and the governor. The accelerator is said to permit of varying the speed of the motor between the limits of 250 and 1,200 revolutions per minute.

The gasoline tank holds eighteen gallons and is located in the front seat of the vehicle.

COOLING SYSTEM.

The cylinders are water cooled, the cooling system comprising the usual supply tank, circulating pump and radiator. The water tank has a capacity of fourteen gallons and is located at the extreme rear of the car. The pump is of the gear type, and is driven through spur gears from the engine crank shaft. A large radiator is placed in front of the car and quite low, where it is exposed to the air currents stirred up by the motion of the vehicle. It is supported at the rear by the front cross bar of the frame, and in front by a steel tube connecting the front seats of the two spring arms. The radiator consists of twenty-four tubes of ¾ inch brass tubing, 28 inches long, with square gills. The tubes are fitted into headers which, when removed, allow of easy cleaning of the tubes. The pump is fixed to the motor in such a manner that it can be removed by only loosening two unions and removing two nuts.

LUBRICATION.

All the main bearings both of the motor and the transmission are oiled by a piston pump positively driven from the cam shaft of the motor through an intermediate shaft with universal joints. The different feeds of the pump can be separately adjusted, and if this adjustment has been properly made every bearing is sure to get its proper amount of lubricant.

TRANSMISSION GEAR.

The transmission system is composed of

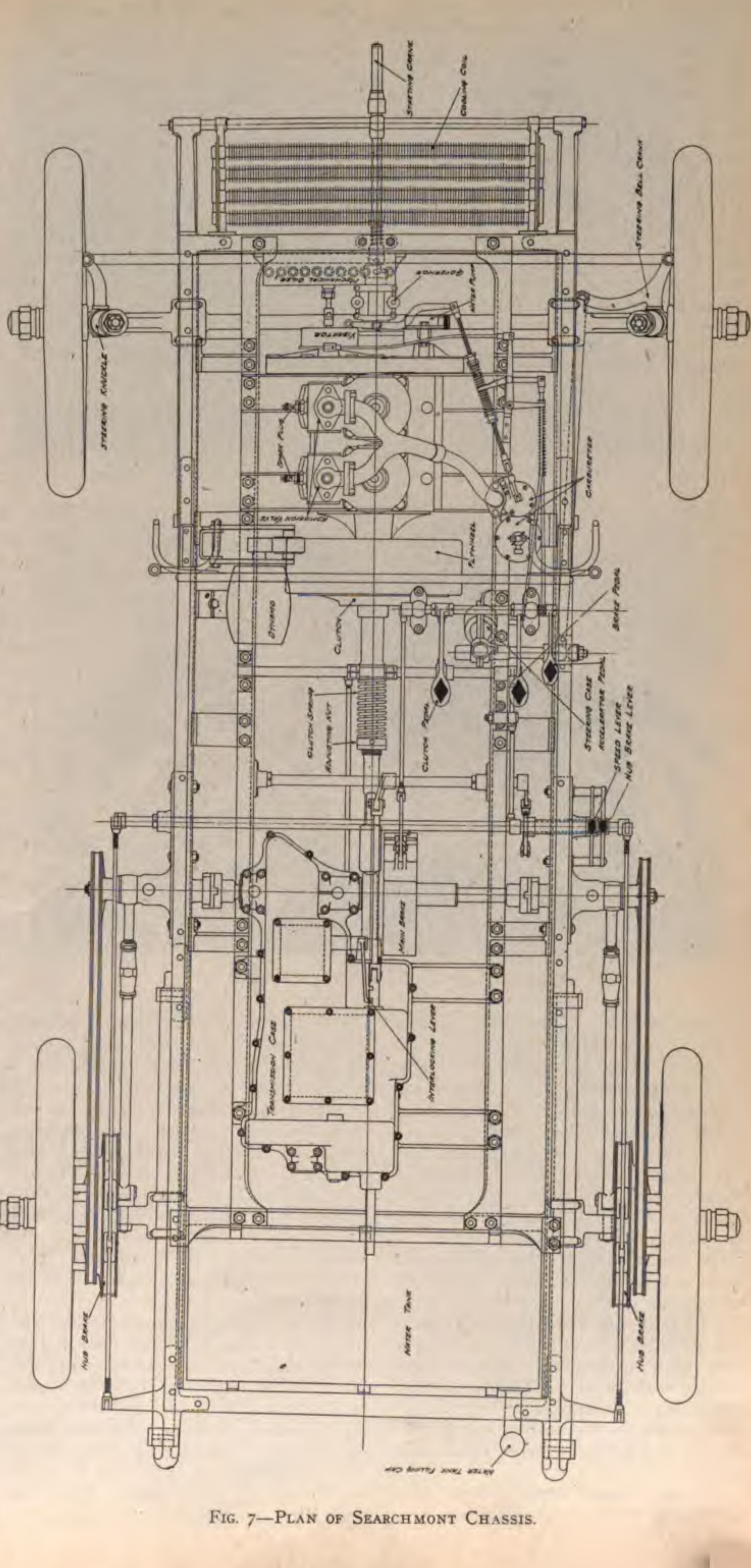


FIG. 7—PLAN OF SEARCHMONT CHASSIS.

a conical clutch in the flywheel, operated by a pedal, and a clash change gear, giving four forward speeds and one reverse. All the pinions and gears of the change gear are made of steel and hardened. The four forward speeds are stated to be 7, 16, 24 and 32 miles per hour, respectively, and the reverse 6 miles per hour, and all speeds are obtained by means of a single lever. The transmission to the rear wheels is by separate Diamond roller chains of 1¼ inches pitch and ½ inch width. The sprockets have fifteen and thirty-two teeth, respectively. Special care has been exercised in the design to make the clutch easily removable. It may be removed by slipping the collar on the clutch shaft forward, removing the spring and dropping the clutch shaft down. This permits of making any repairs to the friction lining of the clutch without removing the change gear.

The vehicle is provided with two separate brake systems, one comprising a foot operated brake on the countershaft and the other the usual double brakes on the rear wheel hub, which are operated by a hand lever on the side of the seat. The drums of the hub are 14 inches in diameter, of 1⅛ inches face, and made of tough phosphor bronze. The bands are steel straps, lined with mineral tanned leather, which is claimed not to burn under any conditions. Brake and clutch operating mechanisms are interconnected in the usual manner.

The vehicle has wheel steering through a worm and sector reduction, the steering hand wheel being 15 inches in diameter. The operating devices comprise a change gear and a brake lever outside the seat and three pedals operating the clutch, the transmission shaft brake and the accelerator respectively. In addition, there are the spark switch on the steering wheel and a spark timing lever just below the steering wheel.

The car weighs approximately 2,000 pounds fitted with a roomy tonneau.

The American Gasoline Carriage.

The American Motor Carriage Company, of Cleveland, Ohio, are manufacturing a machine of the runabout or single seat type which is, however, of somewhat more substantial construction than the lighter machines in this class. It resembles the usual American runabout type in that it has a single cylinder horizontal engine and a planetary transmission gear, but varies from the standard in employing wheel steering and semi-elliptic springs. Fig. 1 is a general view of the car and Fig. 2 a plan view of the chassis. Figs. 3 and 4 are an elevation and a bottom view of the engine respectively.

The engine cylinder has a bore of 5 inches and a stroke of 6 inches, and the engine is rated at 5 horse power at 650 revolutions per minute. The exhaust and intake valves are located in line with each other, the valve chamber being a part of the cylinder head. The crank is entirely enclosed and is provided with balance weights A A to insure vibrationless running. The crank chamber is divided in a vertical plane through the centre of the crank shaft bearings. The forward part of the crank chamber tapers down to a flange B, by which the engine is attached to a cross brace of the vehicle frame. The crank case is provided with an inspection door C in the usual manner. The flywheel is located at the side of the engine toward the transmission gear; it is 21 inches in diameter, with a rim of 2½ inches face and 2 inches depth. The transmission gear is located upon an extension of the engine crank shaft projecting from the flywheel. Upon the portion of the crank shaft projecting from the opposite bearing are fixed the cam shaft driving gear D, which is cut with spiral teeth, and the circulating pump E, which is of the gear tooth variety. The cam shaft F runs parallel with the engine cylinder and is supported in two bearings on brackets extending from the cylinder and head castings respectively. Upon this cam shaft is mounted a cam G for operating the contact device of the ignition system, a centrifugal governor H acting upon the ignition contact device, and a cam I for operating the exhaust valve. The exhaust valve is arranged with its stem extending vertically downward and is operated from the cam I by means of a rocking lever J. The jacket of the engine is cast square and is provided with a large hand hole on the bottom side, covered by a plate K.

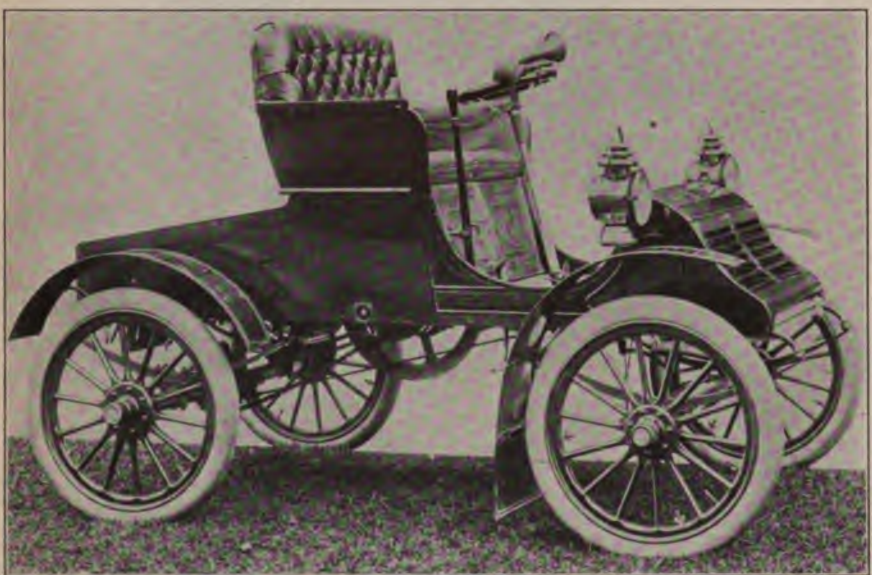


Fig. 1—The "American" Motor Carriage.

The gear circulating pump is held in place by a bracket L, bolted to the crank case of the engine. The connections of the water cooling system are plainly seen in the plan view, Fig. 2. The pump E takes the water from the combined tank and radiator M, and forces it into the jacket of the cylinder head at N. The jackets of the head and of the cylinder are entirely separate and are connected by an outside hose, which effectively prevents any water from getting into the cylinder through leaky packed joints. From the cylinder jacket the water returns to the top of the tank in front, through a rubber hose O. The capacity of the water tank is 5 gallons, and it is claimed that runs of 150 miles can be made without replenishing the water supply. From Fig. 2 it will be seen that in addition to plain tubes ending in headers cooling facilities are provided by tubes passing through the tank in the direction of the vehicle.

The gasoline tank P, which has a capacity of 6½ gallons, is placed in the body of the carriage, opposite the engine cylinder. It is made of copper and is directly connected to the (Longuemare) carburetor Q. The throttle of this carburetor forms the means of regulating the speed of the engine. The exhaust muffler R is quite large and is located transversely in the back of the body. It is covered with asbestos. The engine is lubricated from the oil reservoirs, from which one feed runs to the cylinder and one to each of the bearings. The reservoir holds three pints of lubricating oil, which is claimed to be sufficient for a run of 150 miles.

The transmission gear is of the sun and planet type, giving two forward speeds and one reverse. The forward speeds are controlled by a hand lever, and the reverse is controlled by a pedal. All the bearings of the transmission gear are bushed with phosphor bronze and are lubricated from the oil reservoir referred to by means of gravity sight feeds. The transmission and crank pin bearings receive their lubrication through the centre of the crank shaft. The oil feed to all these bearings and to the cylinder is turned on by the same lever by which the ignition circuit is closed, so that lubrication starts and stops with the running of the engine. The transmission to the rear axle is by means of a double roller chain.

All the machinery is mounted on an angle iron frame, with three cross braces and spring arms in front and rear. The frame is supported by semi-elliptic springs, 36 inches long. The vehicle has a wheel base of 72 inches and a standard tread, and is equipped with wood wheels 30 inches in diameter and fitted with 3 inch tires. Brake drums are attached to each half of the rear axle, and the brake bands acting on these drums are applied by means of a foot lever. The brake band by means of which the reverse speed is obtained can, of course, also be used for braking purposes. The weight of the vehicle complete is 1,200 pounds.

One of the original features of the motor is the contact device of the ignition, which, as stated, is controlled by a centrifugal governor. A detail illustration of this device is given in Fig. 5. In this figure A is the cam shaft; B, the ignition cam pinned to the cam shaft; C, a metal cylinder provided with a base D, by means of which it is bolted to the crank case of the engine. A reciprocating piston within this cylinder is located at piston E, which is drilled from the top and provided at its lower end with a cam roller F. A coiled spring G, maintained in position between flanges on the cylinder and the piston, keeps the cam roller constantly in contact with the cam.

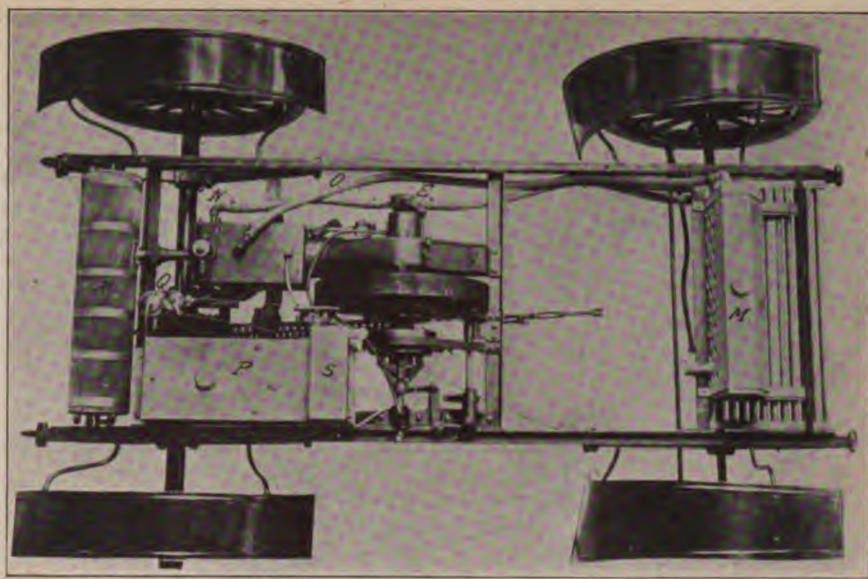
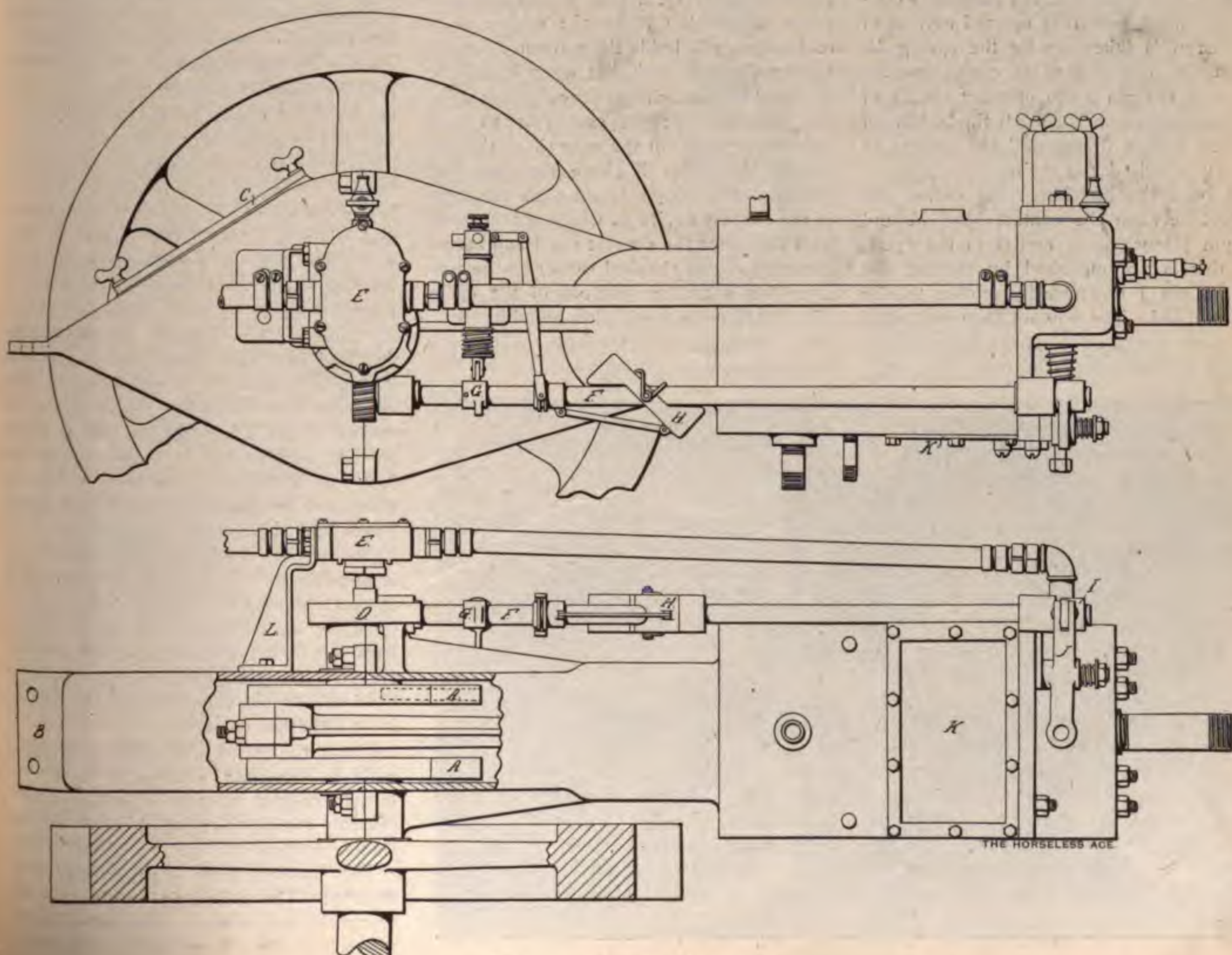


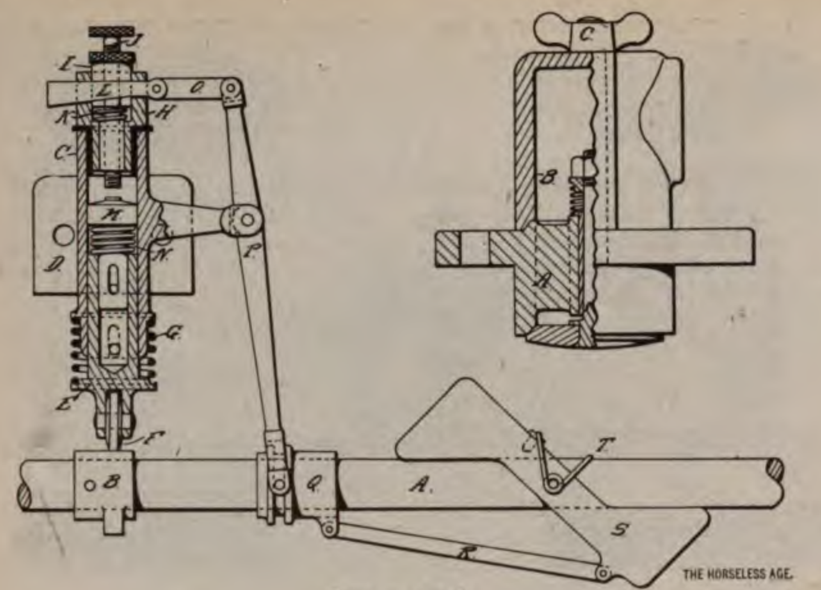
Fig. 2—Chassis of "American" Car.

Into the top an insulating joint of the cylinder C is fitted with a nipple H. Within the upper part of this nipple H is located a bushing I, through which passes a threaded pin J. A small coiled spring K presses the bushing upward against a wedge L, which bears against an inclined shoulder on the bushing. The threaded pin J forms the stationary contact.

Within the bore of the piston E is located the stem of a contact head M. A coiled spring N on the stem tends to force



Figs. 3 and 4—The Engine.

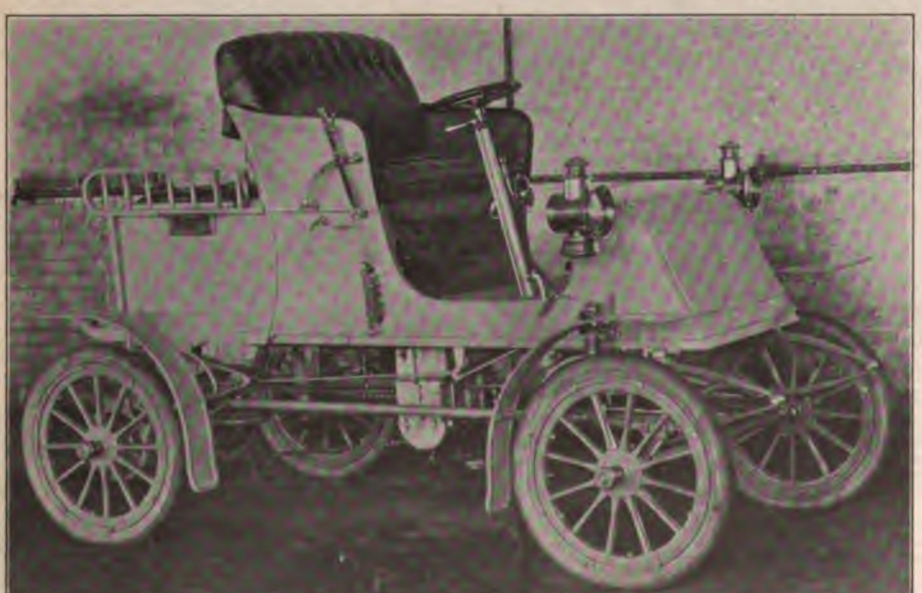


FIGS. 5 AND 6.

it out of the piston, but a pin through the wall of the piston and through a slot in the stem prevents it from doing so. The operation of the device is as follows:

When the raised portion of the cam B comes around to the cam roller the piston E is raised and the contact head M is brought in contact with the stationary contact pin J. Any further upward motion of the piston is taken up by the spring N. When the contact head M comes in contact with the pin J the primary circuit of the ignition system is closed; the buzzer on the coil begins to act and the charge in the engine cylinder is ignited.

To have the ignition occur earlier the contact between the contact head M and the pin J must occur earlier in the cycle, and this is accomplished by moving the contact pin J downwardly, closer to the contact head. The contact then also continues for a greater fraction of the cycle, and as at high speed the time of a cycle is less, this device permits of keeping the time of contact in the primary circuit constant, independent of the speed of the engine. The pin J and bushing I are advanced toward the contact head M when the engine speed increases by means of the wedge L, a link O, a forked lever P, a grooved collar Q, a link R and the governor weight S. When the engine is at rest a spring T holds the governor weight against the cam shaft, but when it runs up to speed the centrifugal force acting upon the governor weight causes it to turn around its pivot on the cam shaft, thereby forcing the collar F along the shaft and drawing the wedge L through the slots of the contact device in which it is located. This depresses the contact pin J and causes contact to be established earlier and to continue for a greater fraction of the cycle. The contact pin J can also be adjusted by hand, being screwed through the bushing I and secured by a knurled lock nut. The



LOCOMOBILE DOS-A-DOS.

contact occurs in an enclosed spac
against dust and moisture.

In Fig. 6 is shown a view of th
valve casing partly in section. Th
is composed of two parts; part A,
the valve seat, valve stem guide and
is provided with a flange by whi
bolted to the valve chamber. Th
itself is made of two parts, a cast ir
head and a steel valve stem, riv
gether. A part, B, affecting the for
L fitting, is bolted to the valve
means of studs and butterfly nuts
makes a ground joint with it. Th
casing is fixed to the top of th
chamber, as seen in Fig. 3.

New Locomobile Dos-a-D

The Locomobile Company h
brought out a dos-a-dos steam carr
either two or four passengers, o
and substantial construction. The
illustrated herewith, and the follow
description furnished us by the m
turers:

The car has a long wheel base
fitted with wheel steering and
wheels. Steam is furnished by a
boiler of the Locomobile type, pr
superheated steam. The boiler is
by steel framework, part of the
forming an abutment for the engine
latter turns on trunnions. These tr
consist of the steam and exhaus
leading from the cylinder casting
engine is of unusually heavy cons
and has two double acting cylinde
This is the same engine that was e
in S. T. Davis, Jr.'s racing car
broke the world's record in the Sta
and trials last May. The engine
with roller bearing crossheads and
bearing shaft; it is very powerful
parts are made of drop forgings,
assembled. The engines are co
enclosed in a dust proof aluminum
The pump, however, is placed out
cover, so that it can be packed rea

One of the novel features of the
is the introduction of levers whi
ject well away from the body of
gine, and by means of which the
boxes and valve stems and pistons
tightened up. A ratchet attachmen
it possible to tighten or loosen th
as much as may be desired. The e
oiled by an octopus lubricator, t
from which is regulated by a valve.
are six oiling pipes which lead to th
head rollers, the valve stem guides
main bearings, respectively.

The burner is of new design and
with a vaporizer and pilot ligh
burner casing is entirely enclose
separate metal cover, which acts as
shield.

The running gear is substantial
structed. The differential is placed
rear axle, and power is transmitted
rear wheels by a large, heavy roller

The equipment of the car incl

steam air pump, a steam water pump, a superheater, a Klinger gauge and an automatic cylinder oil feed. The following are the specifications of the car:

Wheel base, 6 feet 6 inches; tread, 4 feet 6 inches; boiler, 16 inches; burner, 16 inches; gasoline capacity, 10 gallons; water capacity, 33 gallons; wheels, 3x30 inches; tires, 3x30 inches; two band brakes on rear hubs, with ratchet; roller bearing rear axles.

The Hasbrouck Four Cylinder Engine.

The Hasbrouck Motor Works, Yonkers, N. Y., have brought out a four cylinder gasoline engine which is rated at 15 brake horse power. The engine was originally intended for launch propulsion and is somewhat heavier than motors of like power that are intended to drive vehicles. The weight with flywheel is 500 pounds. The latter has a diameter of 18 inches and a rim of 3 inches face and a thickness of 1½ inches. Its weight is 80 pounds.

The cylinders are of the individual type and have separate heads, which are ground to their seats; no gaskets are employed between heads and cylinder castings. The bore is 4⅜ inches and the stroke 6 inches, and the normal speed is 600 revolutions per minute. All the port valves are of the same size and are interchangeable. Both inlet and exhaust valves are mechanically operated from a single cam shaft, which revolves in five bronze bushed bearings. The crank shaft is a solid steel forging and rests in three bearings. The central bearing has no cap and consists of a bushing and a stool, which latter is bolted to a pad that is cast integral with the crank case, and is bored out at the same time that the latter is turned up. Thus disalignment of the bearings is guarded against. The crank pins have a diameter of 1¾ inches and the journals are of the same dimension. The bearing that adjoins the flywheel is 5 inches long; the central bearing 2¾ inches; and the third bearing is 4¼ inches in length. To reduce weight the crank cases of vehicle engines are to be cast of aluminum. At present the case is made of iron and as a result is quite heavy. To permit of ready access to the connecting rod bolts, four large doors are provided. Each one is secured by a single bolt and may be removed instantly. The connecting rods are of a circular cross section and are held to their boxes by bolts. The rod boxes are of the marine type and are made of phosphor bronze. The wrist-pin ends are bushed. The diameter of the pins is 1⅛ inches. Three rings are used in connection with each piston.

Ignition is by primary spark, and a magneto furnishes the current. When starting a dry cell battery is called on. To time the spark a hand lever is provided, which shifts a strip of metal that changes the position of the vertical rods of the make and break mechanism relatively to their cams. Should the purchaser prefer jump spark ignition the makers will provide it.

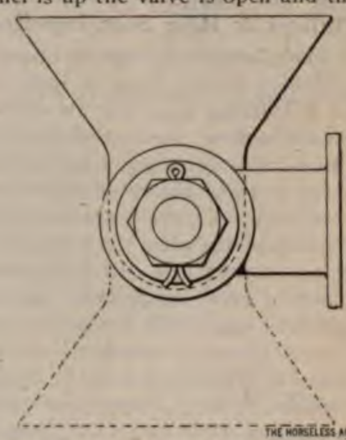
A single port casting of brass is employed to conduct the mixture and waste gases to and from the cylinders respectively. This is marine practice and a feature which the builders do not intend to embody into their vehicle engines in order to save weight. Likewise the plunger pump which forces the water through the jackets will give way to a rotary pump. Another plunger pump is used to force gasoline from the tank to the vaporizer. The latter is of a special design and is provided with means for regulating the mixture and air. The main admission pipe has a diameter of 1½ inches, while the exhaust pipe has a free diameter of 2 inches. The crank shaft bearings and each cylinder have an individual sight feed oil cup.

National Automobile Supply Company's Anti-Sooting Spark Plug.

The National Automobile Supply Company, of 715 Nineteenth street, Washington, D. C., have placed upon the market a spark plug, here illustrated, in which short circuits due to sooting are avoided by means of an air gap outside the cylinder. The extra gap or break has been incorporated in the plug, which adds no complication to the wiring of the motor, while it furnishes at the same time a convenient means for observing the spark without taking out the plug. It is claimed that a plug arranged with this extra spark gap will defy any accumulation of soot and ignite any mixture that is explosive.

The Baker Automatic Funnel.

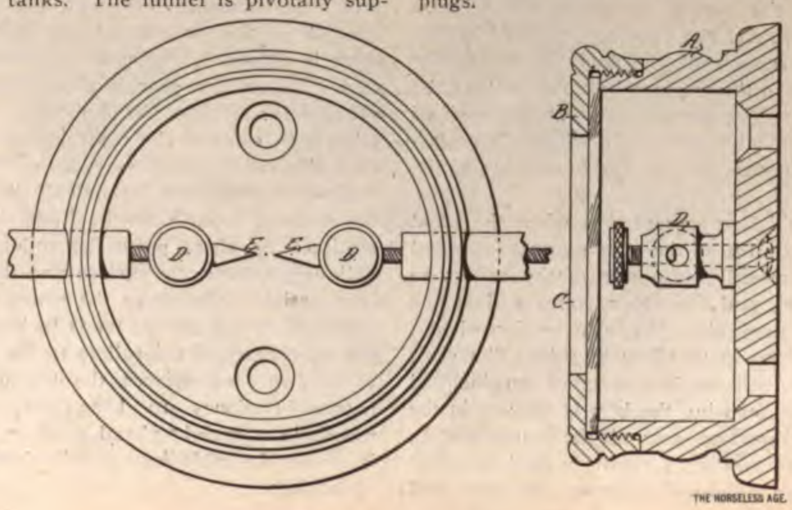
The cut herewith shows an automatic funnel adapted for filling gasoline, oil and water tanks. The funnel is pivotally supported in a T fitting, with which it forms a valve. The central arm of the T is provided with a flange by which it may be fastened to the tank. When the mouth of the funnel is up the valve is open and the tank



may be filled. When it is down (as shown by dotted lines), the valve is closed, and it is claimed that no dust can accumulate and get into the tank. The funnel is made in two sizes by William C. Baker, of 143 Liberty street, New York.

Shain's Spark Indicator and Anti-Sooting Device.

The recently reported French discovery, that an external gap in the secondary circuit of a high tension ignition apparatus would overcome the trouble of the spark plugs fouling, has been embodied in a device marketed by Chas. D. Shain, of 70 Murray street, New York. The device consists of a cylindrical wooden box A with a wood cover B, provided with a glass window C. Within the wood box are arranged two binding posts DD, and the wiring of the secondary ignition circuit is carried to the dashboard (where device is attached), is parted, and the ends are passed through the walls of the case and fastened to the two binding posts. Copper tips EE, with sharp points, are soldered to the ends of the wires that project through the binding posts. The distance between the points of these tips can be adjusted, as will be apparent. The device forms a visual spark indicator and prevents misfiring of sooted plugs.



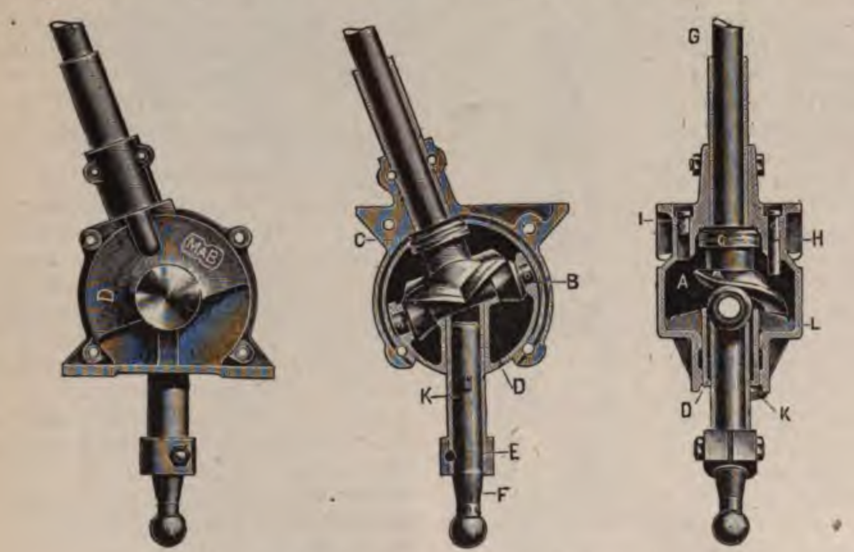
...OUR...
FOREIGN EXCHANGES

The Malicet & Blin Steering Gear.

The French automobile parts manufacturers, Malicet & Blin, have recently constructed a steering gear for automobiles which is claimed to combine perfect irreversibility when the steering wheel is standing in the straight ahead direction, with rapid motion of the wheels about their steering pivots when the limits of deflection are approached. The device is quite simple, which is perhaps the best guarantee of strength and durability.

The steering post, to which the steering hand wheel is keyed, has keyed to it at its lower end a cam A. Below this cam is arranged a box D in one piece with the shaft E, which receives the lever arm F, provided with a ball at its lower end for a the rollers is insured by means of a spring C, not unlike a double split washer, which tends to lower the cam in such manner that all play is avoided, even if there should be considerable wear. The cam and rollers are made of steel and hardened and ground.

The cam of course is subjected only to rolling friction at the contact of the two rollers, which are well lubricated. In case of a violent shock on the arm F the spring C permits the cam A to rise a little, and thus take up the shock and avoid breakage. The cam is formed of two symmetrical surfaces. When the steering gear is in position for straight ahead motion the two rollers are each at the centre portion of one of the symmetrical parts of the cam, as shown in Figs. 1 and 2. It will therefore be understood that the road wheels are brought to the limit of their pivotal motion by a quarter turn of the hand wheel to either



Malicet & Blin Steering Gear.

ball and socket joint. The box D turns in the casing which incloses the complete device. The box D, resembling a part of a pulley, is supported by two horizontal trunnions L, resting in bearings in the casing. The casing is provided with an opening at the bottom for the arm F to pass through, and the opening is closed by the outer surface of the box D, which fits snugly to the machined interior wall of the casing. The box D supports the shaft of two conical rollers B B, which always remain in contact with the lower face of the cam A.

It will be apparent that when the hand wheel on top of the steering post is turned the cam will cause one of the rollers to descend, and the other roller will at the same time rise, the cam surface being shaped so as to allow of this. The shaft of the rollers thus assumes an inclined position, causing the box D to turn in the same direction around the trunnions L, and the arm F to rotate around its pivot support. Contact between the cam and side. Moreover, the cam is cut in such manner that in its central position a tangent plane to the cam surface at the line of contact with the roller is parallel with the axis of the trunnions L. Consequently, when in this position all reaction on the arm F is transmitted through the rollers normal to the surface of the cam, and there is absolutely no tendency to turn the cam. Hence, the gear is absolutely irreversible for straight ahead motion.

To both sides of the central part of the cam the cam surface may be given any inclination necessary for quickly bringing the steering wheels to the limit of their motion. At these parts the rollers bear obliquely on the cam surface and the gear is reversible. Owing to the action of the spring C, which always tends to bring the line of contact of the rollers to the centre of the two cam surfaces, the device has a natural tendency to keep the vehicle wheels in a straight ahead position, which is a very desirable feature.—*La Locomotion Automobile.*

Automobile Show in Stockh

An automobile show will be held Idrottsparken, Stockholm, Sweden 16 to 24 next, under the patronage Crown Prince of Sweden and N The exhibits will comprise b vehicles, automobiles de luxe and cycles. Following are some of the tions regarding participation in thi bition:

No space rent is required to be p the exhibitors; the objects exhibit be insured against fire during the pe the exhibition by the managemen management will bear the costs of ing the exhibited objects, but will no responsibility for possible dama theft; the management will secure d entrance and reduction of freight ra such exhibits as are re-exported af show, so that the exhibitors have only for transportation to and from hibition building, erection, dismo packing and cleaning of the stand vehicles exhibited must be at the during the hours the building is c the public; at other times the exhibi at liberty to make demonstration t the boulevards surrounding the bu Applications for space, accompanied tailed information regarding the ki mensions and value of the exhibi with photographs or drawings, sho addressed to the management of th mobile Exhibition, Idrottsparken, holm, previous to April 1.

Motor Bicycles.

A paper on motor bicycles was r fore the Automobile Club of Great and Ireland on February 20. The advantages and disadvantages of t tor bike are enumerated and discu detail. An advantageous feature machine is the accessibility of its mechanism, but the machine is p for this accessibility by being exp wet and to blows. The lecturer tuated the extreme importance of smoothness, of the absence of unne roughness, projections, straps, cl pieces, moldings, levers, ornamen In the case of any sport that attire becoming which is most suitable, a kind of motor carriage work which in external ribs and moldings, and levers, and where the aluminum is expense bumped out into queer re curves, which make windage and dust, will disappear. The author su to compare the simple lines of some ican designs with the ungainly ald fullness of the bulbous profile whic parted at great expense to the b some much prized "tonneau" bodies

Something similar applies to mo cycles.

Owing to the independent man of accessories, almost every detai accessory, and seems to be added afterthought, so that numberles

catching straps, buckles, bolts and holdfasts, Bowden wires, clamps, exposed electric wires, and gasoline pipes pervade every part of the frame, and the machine is consequently uncleanable.

A smooth exterior is not the only good point for the surface type of carburetor. To be quit of the float feed, the fine dirt catching pipes and spray holes, the long induction tube, the failures to spray at half throttle, and the comparative complexity of this little bit of clockwork, is not nothing. Besides, there is the gain in power (the experiment has been done), the ease of starting, and immunity from almost every trouble is not easily outbalanced by compactness—if, indeed, there be any great extra compactness in the spray type. It is true the Minerva type was not carefully worked out. It was not lagged to guard against the cold wind, nor was there any provision to prevent the mixture varying from splashing with a bumpy road, but all that has practically been cured, so the author hopes that (up to 3 horse power engines) we shall soon return to this admirable, if unfashionable, device.

The character of the road surface which produces skidding with a car is quite different to that which requires caution with a bicycle. It is generally known that an exhaust valve lifter is indispensable in this connection; but a very delicate carburetor which does not fail to give mild explosions when the throttle is nearly closed, and which in conjunction with mechanical valves will keep the engine running "dead slow," is a useful safeguard against skidding. The next safeguard is a flexible drive. Advantage in this direction will be derived from flywheels being much larger without being heavier. The jerks will be diminished, and as it is the beginning of a slip that must be avoided, every trifle counts. Also, if these larger flywheels were to rotate in the opposite direction to the road wheels, then gyrostatic action would assist the rider in keeping vertical instead of acting in the opposite sense, as they do now.

The gyroscopic action would not even then diminish the amount of side pressure on the ground, but it would diminish the amount of slope of the bicycle, and a slip in which the rider and both his wheels take part unanimously is not so disconcerting as one over which they are divided. In fact, Mr. Arnot stated that in the Ardennes race he had slipped some three yards horizontally without losing his seat, and many have had similar experiences on a smaller scale.

Three things are retarding the progress of motor cycle design: (1) There is not enough work done in the engineer's drawing office. (2) The influence of fashion is far too strong, and is only inadequately counterbalanced by cranks and "mania." (3) Ready made accessories, however good, which must be fitted in hamper and distort the unity of design.

Uniform Regulations in Germany.

At the session of the German Reichstag on February 18 a representative, Dr. Pachnicke, called the attention of the Secretary of the Interior to the desirability of a uniform imperial law regulating the use of cycles and automobiles, and pointed out that at present there are at least thirty different regulations in force in different parts of the country. The Secretary of the Interior, V. Posadowsky, replied as follows:

"The operation of motor vehicles is at present regulated by police ordinances, but the associations of cyclists and automobilists have requested the German Governments to come to an understanding with regard to uniform rules controlling the traffic of these vehicles on public highways, streets and places. I have put myself into communication with the United Governments in relation to this matter, and all the Governments are agreed that such uniform principles should be decided upon which should serve as the basis for the police regulations. Such principles have already been worked out in the Department of the Interior and have now been submitted to the Prussian authorities for approval. I hope that the question may soon be definitely settled in this manner."

On March 6 there was a discussion on legislative proposals before the A. C. G. B. and I.

Two coats of hot oil carefully applied after thorough cleaning of the metal are recommended by a Canadian artisan as an improvement over any process now in use for preventing rust of iron and steel. The oil would fill crevices, cracks, and holes where paint cannot enter. It would cover rough places often imperfectly coated in ordinary painting.—*English Mechanic.*

A novel idea was carried out by the Peugeot firm in France in connection with the recent fuel consumption trials. A public vote was taken through the columns of the *Auto*, in which the automobile public were asked to answer the following questions with regard to the type of vehicle which they would for their own instruction prefer to see engaged in the trials. The average of the replies was as follows: Weight of car—light? 1,200 to 1,400 pounds. Horse power? 6 to 8 horse power. Speed on the level, 24¾ to 29 miles per hour. Speed up Suresnes Hill (3 per cent.)? 17 1-3 miles per hour. Speed up Epernay Hill (8 per cent.)? 9¼ miles per hour. Number of passengers? Four. Cost of running per 61.2 miles? 60 cents. Price of car? $1,000. In response to the public request, then, Messrs. Peugeot entered three cars complying with these conditions, with the result that one of them secured first honors in their class, "voitures légéres."

LEGISLATIVE AND LEGAL.

New York State Legislation.

At the instance of Townsend Scudder, of New York, counsel for the Long Island Highway Protective Association, bills amending chapter 568 of the laws of 1890 in relation to highways were introduced last week in both the Assembly and Senate. The amendments give the board of trustees of any incorporated village and the highway commissioners of any town the right to adopt ordinances regulating the speed of automobiles on its highways within 1 mile of any post office, the point at which the speed is to be reduced to be indicated by a sign reading: "Slow down to 8 miles," and also by an arrow. No automobile shall pass a person driving a horse, or on foot, or cross an intersecting highway at a greater speed than 8 miles, or pass a public or private school on the days when a school is held, between 8 a. m. and 4 p. m., or a building of public worship on Sunday during the usual hours of service, at a greater rate of speed than 10 miles an hour, or cross a dam or causeway where the traveled portion of the roadbed is less than 20 feet wide at a greater rate of speed than 4 miles an hour. The registration section of the act is amended to "include the name of the maker and number of the automobile," to make the fee of $1 payable on each machine, &c., and to except from the application of the section automobiles hired out. An automobile is not only to remain stationary when signalled, but "as far as practicable noiseless." The license number shall be placed on an automobile so as to be plainly visible, and be in Arabic numerals, black on white ground, each not less than 3 inches high and one-half inch wide. It provides for the appointment by the State engineer of a competent person who shall be known as the chauffeur examiner, and who shall hold examinations and issue licenses for one year, renewable on payment of a fee of $5. The examiner is to hold office for two years and receive a salary of $2,000 per annum, and to have the power to revoke any licenses for good cause; and upon reasonable notice licensees refusing to exhibit their certificates to a peace officer shall be punished as provided in Section 169B, and a violation of the speed ordinance of any town is further punishable for a first offense by a suspension of the license for not less than two weeks nor more than one month, for a second offense not less than one month nor more than six months, for a third offense by a revocation of the license, and for a fourth offense the licensee shall be disqualified from receiving another license. Section 169B makes a violation of any municipal ordinance a misdemeanor punish-

able by a fine of not exceeding $50 for the first offense, not less than $50 nor more than $100 or imprisonment not exceeding thirty days or both for the second, and imprisonment not exceeding thirty days and a fine of not less than $100 nor more than $250 for the third or subsequent offense.

Since the bill was introduced there have been several conferences in New York by those opposed to and in favor of the passage of the amendments, and all were to be represented at a hearing scheduled to be held before the Assembly committee yesterday. The hearing before the Senate committee has been set down for March 24. It is predicted that the act will be materially amended before it is enacted into law.

A bill to license chauffeurs has been introduced both in the New York Senate and Assembly. It provides that automobilists shall file with the Secretary of State a statement giving their names and addresses and descriptions of their machines, for registering which they shall pay a fee of $1, for which a certificate giving a registered number and classification letter shall be issued. All motor vehicles are to be classified according to their power, those having less than 10 horse power being Class "A," and for each higher multiple of 5 horse power to be classed "B," "C," "D," etc. A board of examiners to license operators of motor vehicles is to be maintained in every city, town and village. The board is to consist of two or more persons, one of whom shall be, whenever practical, experienced in the operation of motor vehicles. In cities the examiner shall be designated by the head of the police department from members of the department. In towns the board of examiners shall be members of the town board, and in villages members of the village trustees. Chauffeurs must pass an examination before this board, and upon payment of $1 are to receive a license. No person is to be permitted to operate a motor vehicle without such a license. A motor vehicle must have displayed conspicuously upon the back its registered number and its classification letter. Operators of motor vehicles must show their license at any time when requested to do so by a peace officer. Two convictions of violation of any law or ordinance relating to motor vehicles is to result in the revocation of the operator's license. The penalty for violation is fixed at $500.

New York City Licensing Ordinance.

On March 10 an ordinance was introduced in the Board of Aldermen, New York, by Alderman Doull, to license operators of motor vehicles. It provides that after ninety days from its passage no person shall operate an automobile unless duly licensed and examined. No such vehicle shall be operated unless it carries conspicuously on the back thereof the license number of the operator in white letters at least 3 inches in height on a black background. The chief of the bureau of licenses shall appoint a board of examiners consisting of two persons, one of whom shall be experienced in the operation of motor vehicles, and the board of examiners shall make a thorough examination into the experience and skill of every applicant, and upon the payment of a fee of $2 shall issue a certificate which shall be put on record by the board and which shall be exhibited by the applicant to a police officer when requested. Upon a second conviction of a violation of any State law or city ordinance the license may be revoked and no other license shall be issued to the same person within one year from the date of revocation, and no person who shall have been refused a certificate shall be again examined within two months of such refusal. Failure to comply with the ordinance is made a misdemeanor and is punishable by a fine of not exceeding $100 for each offense, or in default thereof by imprisonment not exceeding thirty days. The ordinance was referred to the committee on laws and legislation, with instructions to have a public hearing thereon.

Hearing on Connecticut Automobile Bills.

The committee on public health and safety of the Connecticut Legislature gave a hearing last week on three automobile bills. The first provides that power vehicles shall not be run over any country road except the main thoroughfare of a town; the second that every power vehicle shall be marked with the name and address of the owner and the third that no power vehicle shall be run over country roads faster than 8 miles an hour.

Mr. Potter, of North Woodstock, advocated the bills and J. Raymond Warren, of Lyme, spoke energetically in favor of restricting speed in the country.

Representative Mason, of Bristol, defended automobiling. He maintained that if horses are afraid of automobiles they are "scairt" at the vehicles, not the speed. The machines will not scare more when going at 15 miles an hour than at 8 miles. He contended that 15 miles is a reasonable rate. Plenty of farmers' boys drive at day or night at three minutes or under.

Franklin T. Brown, of Norwich, argued that there is a natural feeling about automobiles, inasmuch as they are an innovation. The great majority of automobilists are law abiding. To be sure there are exceptions, but the exceptions are mainly among the young and "fresh." A law generally condemnatory of automobiles would be unfair to the general army of users. Horses were frightened at bicycles and electric cars, but have grown familiar with them. In time they will become familiar with automobiles. To limit the speed of automobiles to 8 miles an hour on rural roads would interfere seriously with the pleasure of chauffeurs. Most of these are law abiding.

Dr. E. B. Hooker, of Hartford, ascribed the trouble to lawbreakers and held that it would be an injustice to punish the men and women who keep the law. Physicians are using power vehicles more and more and it would be a hardship to limit them to 8 miles an hour when they are summoned in haste to the bedside of sufferers.

Dr. E. J. McKnight said he knew that his machine was safer for himself and the public than the safest horse in Hartford.

M. J. Budlong, of the Electric Vehicle Company, declared that several thousand workmen in Connecticut are employed in the manufacture of power vehicles. The passage of the bills would interfere with the industry. Mr. Budlong introduced statistics to prove that automobiles can be stopped in about half or third of the distance in which a horse drawn vehicle can be stopped.

A. E. Rowland, of Fairfield, introduced copies of laws in other States. He advocated registering and lettering automobiles.

Police Commissioner Charles G. Huntington said that at times it is necessary that the police ambulances go at the rate of 12 miles an hour.

Representatives Warner, of Woodbridge, and Armstrong, of Franklin, insisted that farmers be protected against power vehicles.

Andrew F. Gates said that the interval between the ideas of the men for and against the three bills was short. There is a law which would remedy the evils if it were enforced. To it could be added lettering or numbering the automobiles.

The Grim Automobile Bill.

Following is a digest of the Grim automobile bill which has been introduced in the Pennsylvania Senate:

No automobile shall be operated upon any public highway of the State until the same has been registered by the owner in a prothonotary's office, and every applicant for registration shall set forth in writing his and the owner's name and residence, the name of the manufacturer and the number of the automobile. The prothonotary shall then issue a registration certificate for which the applicant shall pay $4, but which shall not be valid until it, as well as the registration number, has been posted in a conspicuous place on the automobile, and the registry shall be void if the automobile is operated upon a public highway when either the certificate or number is removed therefrom.

No person shall be allowed to operate an automobile until he shall have passed a satisfactory examination in its operation and construction before the State Board of Highway Commissioners, and received a license from a treasurer of a city or county.

The speed is limited to 8 miles an hour within, and 12 miles an hour without, cities and boroughs. Every applicant for a li-

cense shall present to the treasurer a certificate from the commissioners that he is not a person of intemperate habits, and that he possesses sufficient skill to be entrusted with the operation of an automobile upon the public highways, but before a license is issued the applicant shall make oath before a prothonotary that he will not operate an automobile at higher speed than above specified. Before a non-resident of the State can receive a license he must, in addition to the above requirements, file a bond for $5,000, with sureties to be approved by a Court of Common Pleas. No license shall be valid for more than one year. It shall be issued on or after January 1 and expire on December 31 following. The annual license fee shall be $10.

Every operator shall display in a conspicuous place, both on the front and back of his automobile, his registry number, in numerals not less than 6 inches square; shall sound a gong or other alarm when approaching a crossing; shall have no right of way, but shall stop his automobile when signaled by the driver of any horse or other animal, until they shall have passed in safety. Every operator shall exhibit his registry certificate when required by a constable or public officer, who shall arrest without a warrant any violator of the provisions of the act, which violator, in addition to the civil liability, shall be deemed guilty of a misdemeanor, and upon conviction shall pay a fine of not less than $500, and be imprisoned in the county jail for not exceeding thirty days, for each offense; provided that any person convicted of violating either Sections 1, 5 or 7, shall forfeit the automobile found in his possession. Any officer arresting or any person giving information leading to the conviction of any violator, shall receive $50 of the fine. The act shall not apply to any race course or private road nor to automobiles which manufacturers may have in stock.

Scovel Bill Amended in Senate.

The automobile bill which recently passed the New Jersey House by a vote of 39 to 2 has been held up in the Senate by Senator Cross, chairman of the committee on municipal corporations, before which the bill has been pending. Last Thursday Senator Cross reported the bill with an amendment which reduces the speed from 20 to 15 miles per hour, i. e., from 1 mile in three to 1 mile in four minutes in the open country. A hearing on the matter was scheduled for March 16, when Winthrop E. Scarritt, president of the Automobile Club of New Jersey, said, in a communication, dated March 13, to automobilists urging them to work against the amendment, the matter will be decided. Mr. Scarritt also pointed out that Senator Cross' amendment was not supported by his colleagues on the committee, and credited to the prompness and energy of automobilists the passage of the bill in the Assembly. He declared: "The Cross amendment in the Senate is the only thing now in the way of decent, uniform automobile legislation for the entire State. This proposed amendment appears to be the last ditch of our opponents."

Higginson's Substitute Bill.

The postponed hearing on bills regulating by law the speed of the autos in Massachusetts came before the Roads and Bridges Committee on March 16. There was much laughter at the expense of the auto and much needless talk by the champions of the bill, which at last resulted in what is known as the "Higginson Substitute Bill." This bill leaves on the statute books the restrictions now existing and adds some others. It is not a compromise and none seems to have been offered so far. The new bill is very much opposed by the automobile owners, and every means will be taken to secure a bill more favorable to their interests.

Manchester, Mass., has appropriated $500 to pay for an extra day policeman to enforce an automobile speed ordinance adopted by the town on March 10.

The superintendent of police of Pittsburg, Pa., has issued an order requiring the police to arrest all violators of the automobile speed ordinance recently passed.

The Commissioners of Parks of New York have adopted an ordinance which prohibits instruction in operating automobiles being given in the parks and parkways.

Harry M. Wells, superintendent of the Prescott automibile factory, Passaic, N. J., was held under $300 bail on March 11 on the charge of having taken and disposed of some anodes belonging to the company.

C. N. Goodwin has issued an opinion for the Chicago Automobile Club, in which he holds that the automobile numbering ordinance is unconstitutional. The power to require private vehicles to be numbered is declared never to have been delegated to the city council.

On March 9 a judgment for $41,023 was entered against the Pioneer Power Company of London, in favor of Walter H. Knight, New York, on an assigned claim of Joseph H. Hoadley for the amount due on electric vehicles and steam auto trucks.

The Court of Errors and Appeals of New Jersey has sustained the action of the Court of Chancery in dismissing the two suits instituted by Richard Siegman, of New York, against the Electric Vehicle Company and its directors, and in which it was sought to compel the directors to pay back into the treasury of the corporation certain dividends alleged to have been illegally declared in 1899 and 1900.

At a recent special meeting of the Pueblo (Col.) Automobile Club, called to consider the West automobile law (Senate Bill No. 197), it was resolved "that we condemn said bill as unfair and un-American because it is entirely class legislation and unfair to our citizens who are progressive. If the restrictions include horses as well as automobiles we have nothing to say, but the law is unfair on the face of it and should never be passed. Said bill is a blow to civilization."

In a protest of Hammel, Riglander & Co. in regard to an importation of ground glass lenses which had been assessed at 45 per cent. ad valorem and 10 cents per dozen pairs, under paragraph 109, but which the protestants claimed were properly dutiable at the rate of 45 per cent. ad valorem as "projecting lenses" under paragraph 111, was overruled on March 8 by a decision of the United States Board of General Appraisers, New York. The decision applies to lenses used for automobile lanterns.

MINOR MENTION

Charles E. Miller, New York, announces that he has just received from Brampton Brothers a shipment of chains to fit Panhard cars.

J. M. Bridges, 1805 Wallace street, Philadelphia, writes that he and R. S. Crawford, Hagerstown, Md., are looking for a site, preferably in Eastern Pennsylvania, for an automobile factory.

Leopold E. Wagener is promoting a line of auto 'buses between Binghamton, N. Y., and Wagener Park. The vehicles are being made by the Davenport Manufacturing Company, Minneapolis, Minn.

An automobile and parts manufacturer is reported to have made a proposition to the Palmer (Mass.) Business and Social Club to locate there, provided they invest a small amount of capital in the business.

The following officers of the Brockton Automobile Club have been elected for the coming year: Dr. F. E. Constans, president; W. E. Trufant, vice president; H. P. Horton, treasurer, and W. H. Marble, secretary.

Nelson P. Baker writes that he has made connections as manager with the Morlock Automobile Manufacturing Company, which has purchased the entire plant of the Spaulding Automobile and Motor Company, Buffalo, N. Y.

At a recent conference between Samuel Gompers, president of the American Federation of Labor; President Mahon, of the Street Railway Employees of America, and Chairman Dilsworth, of the National Board of Street Railway Employees, the idea of forming a stock company to operate automobiles during railway strikes was discussed, and if the plan is carried out it is said thirty automobiles will be

sent to Waterbury, Conn., to be operated by strikers for passenger service.

The Central Automobile Station, of Pittsfield, Mass., has opened for business.

Guy W. Buxton was recently appointed auditor of the H. W. Johns-Manville Company, New York.

The Long Island Automobile Club, Brooklyn, New York, on March 15 had a run to Staten Island.

The Searchmont Company is having plans drawn for 150 houses at Trainer, Pa., for its employees.

Springfield Automobile Headquarters, Springfield, Mass., have secured the agency for the Stevens-Duryea automobile.

The City of New York is asking for bids for asphalting certain streets, an appropriation of $800,000 having been made for this purpose.

It is said that the recent show of the New England Automobile Association, Boston, cost from $1,000 to $1,500 more than the receipts.

A. W. Van Alstyne is erecting an automobile station on Carlton street, Rochester N. Y. It will be of brick, two stories high and 40x100 feet.

Sterling Elliott, former president of the League of American Wheelmen, is reported to have invented a turntable for use in auto barns and garages.

Leonard Anderson, formerly of Painesville, Ohio, who died recently at Marion, Ind., was a pioneer automobile maker. It is said he built a steam carriage thirty years ago.

The American Touring Car Company has opened a new storage and repair shop at 62 West Forty-third street, New York. The company is the local agent for the Jones-Corbin car.

The Ray Automatic Machine Company will remove from Cleveland to Berea, Ohio, as soon as arrangements can be completed. The company will manufacture automobile fenders.

It is said that the Automobile Association of New Jersey is being organized by Charles Carson, New York, who is reported to have leased Elkwood Park, Long Branch, for automobile headquarters and racing.

In a letter addressed to the Automobile Club of America, the Locomobile Company of Great Britain have offered their headquarters in London as storage place for the American vehicles to compete in the coming Gordon Bennett contest.

We are informed that a thief recently broke into the garage of the Sidney B. Bowman Automobile Company, 52 West Forty-third street, New York, and stole a Thomas tonneau. The police were informed and detectives put on the case, who apprehended the culprit with the machine at Yonkers, N. Y.

The Automatic Lubricator Company, Chicago, have issued a catalogue in which are described some new features for 1903. One is a cheaper "Multiplex," which has an inexpensive reservoir in the body or under the bonnet of an automobile with the sight feeds alone arranged on the dashboard.

The price of the Stevens-Duryea automobile has been advanced from $1,200 to $1,300, which includes top and complete equipment.

The Eastern branch of the Badger Brass Manufacturing Company was opened at 11 Warren street, New York, on March 15. It is in charge of L. J. Keck.

The Berkshire Automobile Club, Pittsfield, Mass., took possession of their new club rooms this week. The rooms are finished in red and gold, the club colors.

The Chicago Automobile Club will organize a run to Mammoth Cave, Ky., the coming season. The machines will start on June 25, and the return will begin July 7.

We are informed by C. G. Fisher that while the show of the Indianapolis associated dealers has been called off the Fisher Automobile Company will hold a show in their new building April 6 to 11.

Dr. F. P. Hoover, secretary of the Florida Automobile Association, Jacksonville, is organizing a good roads meeting, which will be addressed on March 26. The races which were scheduled to be given on March 26, 27 and 28, and for which $2,000 in prizes will be offered, it has been reported will not be held, but this has been denied.

F. G. Hall, a member of the Berkshire Automobile Club, Pittsfield, Mass., has been spending a part of the winter in Jamaica, and has just received a steamer he ordered at the Auto Show in New York. This is said to be the first automobile to go to Jamaica. Mr. Hall will return about April 1. He will not bring the machine with him as he says he has several customers for it.

The New York Motor Cycle Club has appointed a committee of three to obtain an expression of opinion from other motor cycle clubs and unattached riders as to the desirability of effecting a national organization. The idea is to issue a call for a convention of motor cyclists at some central point during the early summer, and there bring the organization into being. The members of the committee are E. L. Ferguson, Dr. F. A. Roy and R. G. Betts.

The following committees of the Syracuse (N. Y.) Automobile Club have been appointed: Membership, F. H. Elliott, J. M. Keese and E. Zahm; Runs and Tours, C. A. Benjamin, H. W. Smith and W. L. Brown; Laws and Ordinances, Henry Walters, G. K. Betts and A. T. Brown; Roads, G. S. Larabee, L. C. Smith and H. H. Franklin. The following new members were elected at the last meeting: C. A. Lee, John Maxwell, M. C. Blackman, S. C. Tallman and O. N. Hine. H. W. Smith, W. L. Brown and F. H. Elliott were appointed a committee on forming a State association.

The Commercial Vehicle Trials of the A. C. A.

The Automobile Club of America will hold on May 20 and 21 a contest for commercial vehicles which will be open to all types of self propelled vehicles used for commercial purposes, made in the United States or abroad. There shall be an observer on every vehicle.

The contest shall cover two days. On the first day vehicles in all classes shall cover the route without stops, except those that are involuntary. On the second day they shall cover the route, making various specified stops, according to their classes.

The route shall be 20 miles long, consisting of a run from the clubhouse at Fifth avenue and Fifty-eighth street to the Battery at the foot of Broadway; from the Battery uptown and through the northern part of the city and back to the clubhouse. Vehicles in all classes to go twice over this route (40 miles) on each day of the contest.

Each contestant shall furnish his own dead load consisting of whatever material he may see fit to carry, which shall be weighed and checked by the contest committee.

The committee will provide at the starting station a certain amount of ballast, in convenient form, to be available to supply any deficiencies in contestants' loads.

Contestants will be required to report to the committees' representatives at the weighing station on the day before the contest with their vehicles empty, so that they may be weighed in that condition, and again (with their dead load on board) on the morning of each day of the contest to be weighed and checked by the committee.

The amount of gasoline, electricity, coal, etc., consumed (which shall be furnished by contestants) will be measured and the cost of operation per ton mile ascertained.

ELECTRIC VEHICLES.

There shall be a class for electric vehicles. All electric vehicles shall be required to go twice over the 20 mile route on each day. They shall be allowed one stop not exceeding three hours for recharging batteries, the time of such stop and the amount of current taken to be recorded against the vehicle.

Ampere metre and volt metre readings will be taken each day before and after the run and before and after all intermediate rechargings.

Electric vehicles shall be subdivided into four classes as follows:

1st Class—To carry a dead load of 750 pounds. (To make 100 specified stops on second day's run.)

2d Class—To carry a dead load of 2,000 pounds. (To make 100 specified stops on second day's run.)

3d Class—To carry a dead load of 3,500 pounds. To make 20 specified stops on second day's run.)

4th Class—To carry a dead load of 10,000

pounds. (To make 20 specified stops on second day's run.)

Each vehicle must carry a dead load of at least 75 per cent. of its own weight in addition to the driver and observer.

STEAM VEHICLES.

There shall be a class for steam vehicles. All vehicles in this class will be required to go twice over the 20 mile route on each day, and will be allowed thirty minutes stop for water.

Steam vehicles shall be subdivided into the following classes:

1st Class—To carry a dead load of 750 pounds. (To make 100 specified stops on second day's run.)

2d Class—to carry a dead load of 2,000 pounds. (To make 100 specified stops on second day's run.)

3d Class—To carry a dead load of 3,500 pounds. (To make 20 specified stops on second day's run.)

4th Class—To carry a dead load of 10,000 pounds. (To make 10 specified stops on second day's run.)

Each vehicle must carry a dead load of at least 75 per cent. of its own weight in addition to the driver and observer.

GASOLINE VEHICLES.

There shall be a class for gasoline vehicles. All vehicles in this class shall be required to go twice over the 20 mile route.

Gasoline vehicles shall be subdivided into the following classes:

1st Class—To carry a dead load of 750 pounds. (To make 100 specified stops on second day's run.)

2d Class—To carry a dead load of 2,000 pounds. (To make 100 specified stops on second day's run.)

3d Class—To carry a dead load of 3,500 pounds. (To make 20 specified stops on second day's run.)

4th Class—To carry a dead load of 10,000 pounds. (To make 10 specified stops on second day's run.)

Each vehicle must carry a dead load of at least 75 per cent. of its own weight in addition to the driver and observer.

AWARDS.

Medals will be awarded, based on economy in cost of operation and time consumed in covering the cost within the legal limit of 8 miles per hour, as follows:

750 Pound Class—A gold medal to the vehicle making the best performance. A silver medal to the vehicle making the second best performance. A bronze medal to the vehicle making the third best performance.

2,000 Pound Class—A gold medal to the vehicle making the best performance. A silver medal to the vehicle making the second best performance. A bronze medal to the vehicle making the third best performance.

3,500 Pound Class—A gold medal to the vehicle making the best performance. A silver medal to the vehicle making the second best performance. A bronze medal to the vehicle making the third best performance.

10,000 Pound Class—A gold medal to the vehicle making the best performance. A silver medal to the vehicle making the second best performance. A bronze medal to the vehicle making the third best performance.

Certificates will also be awarded, stating the performance of the vehicle.

Rules and regulations for the contest will be issued later.

A. C. A. Affairs.

The club is considering plans for increasing the efficiency of the employment bureau for chauffeurs. Among them, it is said, will probably be the licensing of garages on the condition that licensed garages only will be patronized by club members, and that no commissions for supplies, repairs, etc., will be paid to or demanded by chauffeurs by garage keepers.

The system of individual lockers is to be dispensed with, and a box substituted. An excise license has been applied for.

The topic for discussion last night was "Reasonable Legislation and How to Secure It?"

Calendar of Automobile Dates and Events.

March 16—21.—Boston Show, Symphony Hall.

March 23—28.—Washington Show, Light Infantry Armory.

March 21—28.—London Show at Agricultural Hall.

May 10.—Motor Cycle Century Run.

May 20—21.—Commercial Vehicle Contest under the auspices of the Automobile Club of America.

May 24—26.—Paris-Madrid race.

July 9.—Gordon Bennett cup race.

Cramp Bearing Metal, Manganese and Aluminum Bronze.

William Cramp & Sons, of Philadelphia, the well known ship building firm, write us that for some time past they have given careful attention to the requirements of automobile manufacturers in the use of bronzes and bearing metals, and in co-operation with several of the leading American manufacturers have experimented in the use of bronzes requiring great strength and in bearing metals.

They claim to have succeeded in adapting to automobile work their Parsons' white brass, which has been a standard bearing metal for many years in the marine and land engine business in this country.

The Cramp Company also manufacture for the automobile trade gear wheels, brackets, wheel hubs and sprocket wheels of Parsons' manganese bronze. This metal is used quite extensively to take the place of steel castings.

Steel foundries as a rule do not care particularly for small work, and as automobile parts made of cast steel are always small, automobile manufacturers experience great difficulty in getting these castings made properly and promptly. As an advantage of the manganese bronze, it is pointed out that it is much more easily machined and that less time is required in chipping off fins and knobs from the casting. The bronze castings always come true to the pattern and consequently need not be straightened. A further product of the company in this line are aluminum bronze castings for engine frames and casings.

New Incorporations.

The Automatic Lubricator Company, 1137 Caxton Building, Chicago, formerly of Toledo, Ohio, reincorporated with a capital stock of $100,000.

The Videx Automobile Manufacturing Company, to succeed the Marlboro Automobile Company, Marlboro Junction, Mass., with a capital of $1,000,000. O. P. Walker is president.

The Hansen Car Company, Cleveland, Ohio, to make automobile bodies, with a capital stock of $25,000. The incorporators are G. A. Gaston, R. Hansen, M. L. Thomsen, F. H. Gould and C. K. Fauver.

The National Oil Burner and Equipment Company, St. Louis, Mo., under the laws of Missouri. Capital, $300,000. Officers, J. Gerald Branch, president and general manager; John A. Mickle, vice president, and Reid D. Ellis, secretary and treasurer.

The Merchants' Auto-Transfer Company, with a capital stock of $1,000,000, under the laws of South Dakota, to transfer freight in Chicago. The officers are: President, Josiah Cratty; vice president, Charles L. Lindquist; secretary, W. S. Williams, and treasurer, Parker H. Sercomb.

Motor Cycling Clubs.

One of the signs of the advance in popularity of motor cycles in England is the formation of clubs. About eighteen months ago the Motor Cycling Club was established in London, but at that time riders of motor bicycles were too few in the provinces to enroll themselves into societies. With the increase in their numbers the idea of local clubs naturally becomes attractive. Brighton has just inaugurated one with fourteen members. Birmingham is following suit with the promise of support from thirty-five riders, and in other parts steps are being taken to found motor cycling associations. Not the least of the advantages of a club is that if a member's machine develops troubles during a run the united knowledge and aid of the party of riders is at his service to cope with the difficulty.

The New York Motor Cycling Club offers a gold medal to the member who covers the greatest distance in the course of the year and is also organizing a number of runs.—*Daily Telegraph, February 23.*

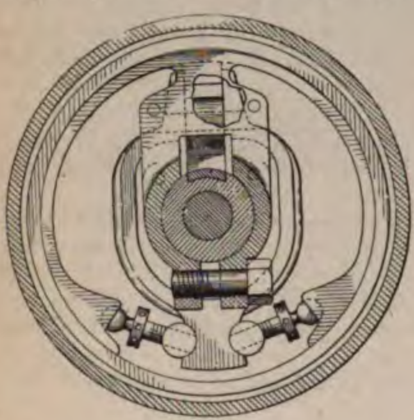
MOTOR VEHICLE PATENTS..

United States Patents.

721,807. Power Transmitting Device.—Thomas B. Jeffery and Robert Symonds, Jr., of Kenosha, Wis. March 3, 1903. Filed March 24, 1901.

This is a sun and planet transmission gear, giving two forward speeds and one reverse. It comprises two sets of planetary gears, two friction clutches of the expanding ring type and one band friction clutch. The gear is mounted on the differential shaft and drives the differential drum through a sleeve connection. The expanding ring clutch is of particular interest.

The structure of the clutches is calculated to cause the centrifugal force of the parts which are free to move centrifugally as the shaft revolves to operate in opposition to the shoe spreading movement of such parts and to oppose even any tendency of the shoe itself to become spread

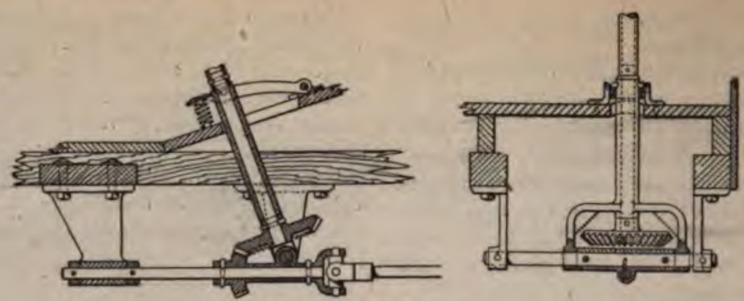


No. 721,807.

by centrifugal force as it revolves. It is for this reason that the toggles are arranged diverging outwardly from a line connecting the ends seated in the divided ring which forms the shoe, so that their own centrifugal force tends to draw their remote ends inward instead of forcing outward, which would spread the shoe. For like reason the yoke in which the toggles are pivoted and which serves as the means for operating the toggles to spread the shoe is made with its principal weight at the side of the shaft toward the toggles, so that its own centrifugal force in revolution tends in the direction to withdraw the toggles and not to spread the shoe.

721,859. Automobile Steering Mechanism.—Herbert H. Buffum, of Abington, Mass. March 3, 1903. Filed January 23, 1903.

The steering post is mounted in a sleeve which is pivoted at its lower end to a bracket depending from the floor beam of the vehicle. The post carries at its lower end a bevel gear meshing with another bevel gear of smaller diameter on



No. 721,859.

a shaft mounted in bearings depending from the vehicle frame and rigidly held against endwise motion by thrust collars. This shaft connects to a screw working in a threaded sleeve attached to the steering knuckle, by means of a jointed shaft.

The pivoting of the sleeve in which the steering post is mounted makes it possible to swing the latter out of the way when entering the vehicle.

In its operative position the steering pillar is rearwardly inclined, so as to be in a convenient position for operation by the steersman sitting in the vehicle seat. The bearing of the pillar is then locked by a foot catch and the bevel gears are thrown into mesh, so that the rotary movement of the pillar is transmitted through the gears to the shafts. Such rotation causes the threaded sleeve to travel on the screw shaft and imparts the steering movement to the ground wheels.

721,705. Vehicle.—Chas. W. Hunt, of West New Brighton, New York, March 3, 1903. Filed October 31, 1902.

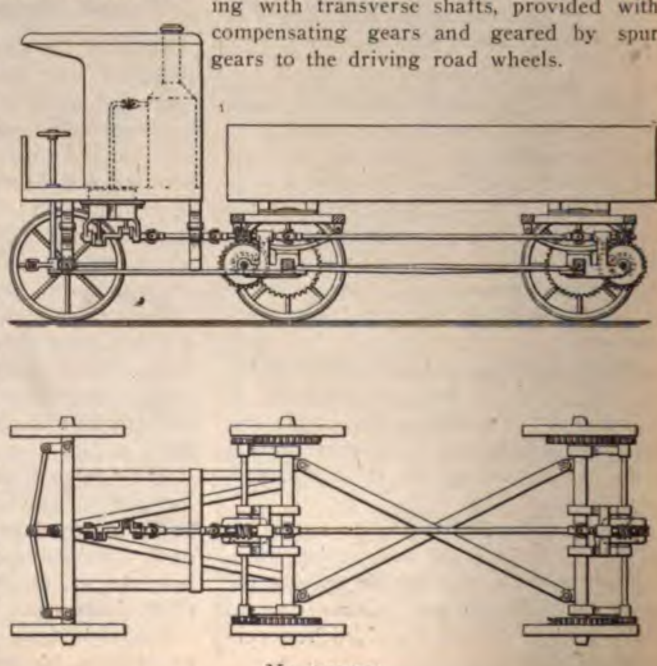
In a former patent issued to Mr. Hunt is described a vehicle having three trucks which are so arranged as to give facility in handling the vehicle around corners. In the application of the improvements to motor vehicles the source of power is mounted upon the forward steering truck, while independent motors are applied to the carrying trucks. Such an arrangement is feasible, especially when electricity is employed as the motive power. When a steam or internal combustion engine is employed as the source of power, it may be less desirable to mount separate motors upon the carrying trucks.

The present invention has for its object to provide driving mechanism for vehicles of the character referred to by which power can be conveniently transmitted from the source of power on the steering truck to the carrying trucks, the improved mechanism being so constructed and arranged as to permit it to adapt itself to the relative movements of several parts of vehicle.

The middle and rear axle are connected together in such a manner that the oscillation of one axle in a horizontal plane produces a corresponding oscillation of the other of the two axles in the opposite direction, whereby the wheels of the rear truck follow the wheels of the preceding truck when the vehicle is turning. The independent forward body is supported upon a steering truck, and upon a rigid frame or reach, which connects the steering truck with the adjacent carrying truck. The forward axle may be swiveled with respect to the rigid frame, or it may be rigid, as represented in the drawings.

The motor is mounted upon the forward body and is operatively connected with the driving or carrying wheels. In suitable bearings on the steering truck is supported a transmission shaft, provided with joints to accommodate relative vertical movements. This section of the transmission shaft terminates in the vertical plane of the middle axle in a universal joint, by which it is connected with a second section of the transmission shaft, which likewise terminates in the vertical plane of the rear axle in a universal joint, by which it is connected with a third section of the transmitting shaft. The location of the two joints is such that the distance between them is not materially changed during the movement of the vehicle.

The sectional shaft gears by worm gearing with transverse shafts, provided with compensating gears and geared by spur gears to the driving road wheels.



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Notice to Advertisers.

Hereafter the first advertising form will be closed on Saturday and the second advertising form on Monday preceding the date of publication. Copy for new advertisements or changes of copy must be in our hands on or before Saturday in order to secure insertion in the succeeding number.

Engine Control of Gasoline Business Vehicles.

It is generally agreed that one of the essentials of a successful motor wagon for commercial purposes is such simplicity of operation that common labor can be employed to run it, the same grade of labor as is employed for driving horse trucks and delivery wagons. It is therefore to be expected that the system of operating levers and pedals of gasoline business wagons will differ considerably from that now becoming standard for high powered touring cars, which is rather complex and, on the whole, is better suited for country work than for use in the city. It is evident that it would take an ordinary horse driver some time to acquire the proper and timely use of three pedals (clutch, brake and accelerator), two hand levers (change gear and hub brake) and three small handles or similar devices(throttle, ignition timer and spark switch). The engine control, for one thing, ought to be simplified, but which of the different controlling devices can most advantageously be dispensed with is a question that will bear a good deal of study.

It was suggested by one speaker at the recent A. C. A. discussion that a constant speed motor would be found the most practical, with speed control entirely by change gear. This does not harmonize with our view of the matter. The flexible motor is of far greater advantage on a business vehicle operating in crowded city streets than on a touring car. With a constant speed motor a three or four speed gear would be required and the gear would have to be changed frequently, because of constantly varying traffic conditions. The frequent change of gear itself tends to rapid wear of the gear and has a tiring effect on the driver. Besides, the engine running constantly at its maximum speed would result in unnecessary wear and in high fuel consumption (except, possibly, if hit and miss governing was employed, which is objectionable, however, on other grounds). The vehicle with effective engine control would be much more easily managed than the vehicle with a constant speed engine, and this is an inestimable advantage when driving in a crowded thoroughfare.

Taking it altogether, there is no doubt that throttle control is the proper method for a gasoline business vehicle. The ignition could be timed automatically and the engine speed be limited automatically by a separate throttle.

The operating devices of a vehicle with a motor so controlled might be reduced to the following: One pedal for operating both the clutch and the brake; two hand levers for the change gear and emergency brake respectively, and a throttle valve handle combined with either the steering hand wheel or the change gear lever. The emergency brake lever, though practically never used, should nevertheless be provided.

Needs of a Legal Definition of Horse Power.

A bill now pending in the New York State Legislature provides that all operators of automobiles over 10 horse power must pass an examination and take out a driver's license. If this bill should become a law it may be expected that vehicles now rated at 12 horse power, or even 15, would have their rating reduced, so as to bring them within the limits requiring no licensed

chauffeur. To base the enforcement of the law on the manufacturer's rating would undoubtedly prove unsatisfactory, hence provision would have to be incorporated in the law whereby the power of the motors could be determined from some definite standard. The actual power of a gasoline engine is a variable quantity, varying with atmospheric conditions, with the character of the fuel and lubricant used and with the state of wear and adjustment of the working parts, and it might almost be said that it is never twice alike. Besides, the term horse power is sometimes used to denote the power actually available at the motor shaft and sometimes to denote the power developed in the cylinder as shown by an indicator. Under such conditions it is not at all surprising that the rating of motors with the same cylinder dimensions varies so much with different manufacturers.

To effectively apply a legislative measure differentiating between vehicles above and below a certain motor power formulæs would have to be adopted for relating the power and cylinder dimensions in a reciprocating motor and power and armature dimensions in an electric motor. For an explosive motor the simple rule, according to which the horse power per cylinder is equal to the square of the bore in inches divided by four, would be very serviceable, and for steam engines a similar rule could be devised, although it would perhaps be slightly more complicated.

The regulations in force in France, where each manufacturer must file with a Government department full details of all types of vehicles he manufactures, could not well be adopted here, owing to the fact that automobile traffic is here regulated by the States, and that in consequence any such measure would involve an enormous amount of trouble for the manufacturers. The idea of differentiating between the small cars and heavy and high powered ones seems to be thoroughly practical and is, we understand, meeting with the approval of the Automobile Club of America. The French law makes a similar distinction between slow and fast cars, fixing the limit between the two classes at a speed capacity of 30 kilometres per hour. This speed constitutes the speed limit allowed in the country, so that the class of fast cars comprises all those capable of exceeding the speed limit. The manufacturer is held to furnish a statement of the speed capacity of the car. This would also prove impractical in this country, owing to our decentralized method of government, and the only practical plan of dividing automobiles into a low and high powered class would be by actual measurements of the motor, as indicated above.

The Business Vehicle to the Fore.

The coming competition for motor vehicles for commercial purposes will once more direct public attention to the possibilities of the motor vehicle in commericial work. Even in trade circles the vastness of this field is little appreciated. Figures relative to the vehicle industry were published in our correspondence columns some time ago, tending to show that by far the greater amount of business was done in pleasure vehicles, particularly runabout buggies, and it was argued from this that in the motor vehicle line also the pleasure car was destined to furnish the greatest amount of business. There is one difference between horse vehicles and automobiles, however, which makes this direct conclusion illusive, namely, that the automobile is horse and vehicle at the same time. If a census were taken of horses and the proportion determined of those kept solely for pleasure driving to those kept for business purposes chiefly, we venture to say that the proportion would be found quite small. What swells the number of horse buggies in use is that a very large per cent. of those who keep horses for business purposes keep a buggy also. If they did not have the horses already, many of these people would not own a buggy.

It needs no extended argument, however, to show that a large amount of capital is invested in business vehicles—i. e., trucks and delivery wagons of all kinds. Anyone living in a large city has the proof daily before his eyes. If the motor vehicle can successfully supplant the horse truck and horse delivery wagon, of which there is no doubt in our mind, we have the foundation for a very large and permanent industry, which should prove a very attractive field for investors, inasmuch as it will be entirely independent of fashions and popular fancies.

The contest to be held in May will be both brief and easy, it appears. As it is the first contest of the kind in this country, there is something to be said in favor of not making the conditions too severe. No contest has ever yet been held anywhere to cover the field of motor city delivery and trucking, and the rules must therefore necessarily be of a tentative nature. At the same time the contest can prove of great benefit to this infant industry, by directing public attention to it and stimulating the interest of business houses in such vehicles. The Horseless Age has always emphasized the importance the business automobile is destined to play in the automobile industry of the future, and is exceedingly anxious to see the coming contest successfully carried through. We intend to devote considerable space to the event and to business automobiles generally, and all readers working on either delivery wagon or trucks are requested to communicate with the editor.

The Automobile Law of Indiana.

A few weeks ago we printed the condensed text of the law recently passed by the Indiana Legislature at the instance of the Indianapolis Automobile Club. The law does not provide any definite speed limits and the club congratulates itself on seeing so liberal a measure adopted. We are in doubt, though, whether there is any cause for congratulation, as the fact that the State law does not establish any speed limits simply means that limits are to be fixed by local ordinances. The result will undoubtedly be a harassing confusion of local regulations, the same as until recently obtained in New Jersey and to some extent in Massachusetts. The subject has been brought to our attention by a reader in Terre Haute, who inquires what conditions should be embodied in an ordinance for a city of that size (50,000 population).

Uniform speed limits throughout a State are of inestimable value to automobilists, but in the absence of such a law automobilists in any locality must direct their efforts to securing as liberal regulations as possible from local authorities.

The most suitable system of speed regulation for a city of the size above mentioned would depend on the uniformity of the streets. If all parts of the city are built up fairly evenly and the streets are uniformly wide and straight, a uniform speed limit of 12 miles an hour anywhere within the city limits would undoubtedly be most satisfactory. Even at 10 miles an hour a single limit would be the preferable mode of regulation. But if some streets of the city are very crowded at certain hours of the day and it is thought impossible to secure a uniform limit of at least 10 miles an hour, a limit of 15 miles an hour in outlying districts should be asked for. Some

of the Western cities are possessed of a mania for expansion, and lay their city limits far out in the country to a point where they expect the built up portion may extend some time in the dim future. In such cities a double speed limit has its advantages, but for small and fairly compact cities we regard a uniform speed limit of 10 or 12 miles per hour as the most satisfactory.

The flood of automobile legislation which was foreshadowed in our Legislative and Legal Number of November 5 last has arrived, and the States of New York, Connecticut, Massachusetts, New Hampshire, Maine, New Jersey, Pennsylvania and Wisconsin are now struggling with bills to regulate the use of automobiles on the public highways. As a result the law committees and leading officers of the organizations which make it an object to protect the rights of automobilists have been exceedingly busy of late in holding meetings and lobbying at the various legislatures. The great attention paid to questions of automobile legislation at present is also reflected by the demand for our Legislative and Legal Number, for which orders are coming in constantly.

To Whom Is the Credit Due?

A dispute has arisen in England as to who first suggested that the Gordon Bennett cup race be held in Ireland this year. According to latest advices there are at least three claimants to the honor of having been the originator of the idea, and by the time of the next mail their number may have still further increased, so that a controversy akin to that about the authorship of "Beautiful Snow" is in prospect. At the time the discussion of this matter began the race was not yet sanctioned by Parliament, and it was therefore still doubtful whether it would be held in Ireland at all. Under these conditions it seems just a little premature to wrangle about honors to which the successful outcome of the event may entitle.

The Organization of Chauffeurs.

As reported elsewhere in this issue, a temporary organization of chauffeurs in New York city was effected at a meeting Tuesday before last, and a further meeting was to be held last night. The attitude of the automobilists and of the industry toward this organization appears to be one of skepticism. It is admitted that if the "chauffeurs' club" is ably and energetically managed it may succeed in eradicating some of the evils which have sprung up in their profession and benefit themselves and their employers. On the other hand it is contended that if trade union influences should manifest themselves in the club and the latter attempt to dictate to the automobilists who employ chauffeurs it would involve a certain danger to the industry. Nothing is easier for a wealthy automobile owner than to store away his autos and resume horse travel, and nothing would be more likely to cause him to take this step than a threatening attitude of a chauffeurs' union. For this reason it seems very important that the chauffeurs' club should be related to the National Association of Automobile Manufacturers in some way.

Calendar of Automobile Dates and Events.

March 23–28.—Washington Show, Light Infantry Armory.
March 21–28.—London Show at Agricultural Hall.
April 11.—Eliminating Contest for Gordon Bennett Cup Race.
May 10.—Motor Cycle Century Run.
May 13–14.—Non-Stop Run of the Scottish Auto Club, Glasgow to London.
May 20–21.—Commercial Vehicle Contest under the auspices of the Automobile Club of America.
May 24–26.—Paris-Madrid Race.
July 9.—Gordon Bennett Cup Race.

Technical Notes on Exhibits at Some Recent English Shows.

By J. S. V. Bickford.

(Concluded.)

Probably the best known motor bicycle is the Werner, and this is, as I have said, the only cycle among those shown which is driven by flat belt. I should rather expect trouble from this source in wet weather. The machine in general is well known and the only point which I wish to draw attention to is the brake mechanism, which is illustrated by the sketch, Fig. 1. A is the belt wheel, and to the frame tube B is attached the short lever C, having the brake pad D at its outer end. This pad on the rising of the lever presses on the inside of the belt wheel. The power is transmitted by a Bowden wire E from the handles of the bicycle.

Among the cars shown the Georges Richard car has several noteworthy features. The engine lubrication is so arranged

Fig. 1.

that the pressure in the engine exhaust pipe forces the oil to the various points to be lubricated. This will be perceived to be a very simple and effective method of automatically regulating the oil supply, and it has the advantage of not having any working parts to go wrong. The steering gear comprises a worm and sector transmission and a ball and socket joint connection. The dies which hold the ball are kept in place by strong springs, as in the Panhard car, which not only helps to relieve the steering levers of road shocks, but, what is much more important, entirely prevents backlash. The writer has tried other types of universal joint for steering gears, and he finds them by no means satisfactory. In the usual pattern of forked joint the dust gets into the bearings and wears the pins in only a few days, till the steering becomes quite unreliable. None of the modern really up to date steering gears are now fitted with pin connections, which is perhaps a sound argument against this type of gear. The writer has found in his comparatively limited experience that it is a thoroughly sound business rule never to adopt an obvious simple way of doing a job which is done by everyone else in a more complex and less obvious way without considerable caution, more especially if there are known to be some good men connected with the industry. It is as a rule fairly safe to argue that a successful manufacturer is not a downright fool, and if he does not use what is under his nose it is pretty certain that there is something rocky about that thing. Fig. 2 shows the up to date steering ball and socket.

There is only one more point to note

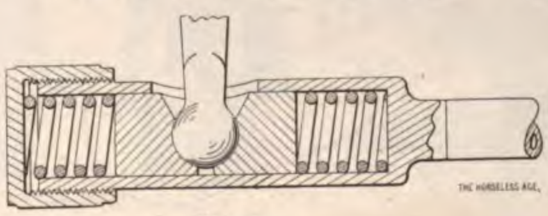


Fig. 2.

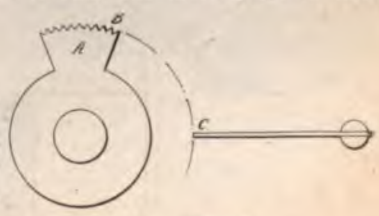
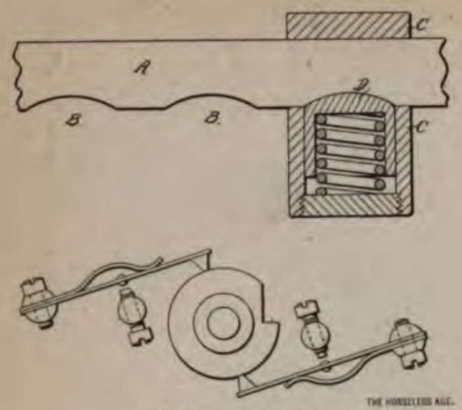


Fig. 5.



FIGS. 3 AND 4.

about the Georges Richard car, and that is the gear box. I suppose most car users, if not makers, have had trouble from the wear of the change speed gear levers preventing the gears meshing completely, and thereby causing the gears to wear onesidedly. To insure an absence of trouble in this respect the makers of this car have a fixed machined bar A, Fig. 3, running through the gear box, and on the under side of it are cut-out notches B. Part of the gear C which shifts the gear wheels runs on this rod and has a spring controlled nose D, which enters the notches when the gears are correctly in mesh. This absolutely prevents the gears not meshing correctly. The trembler of this car is of the ordinary De Dion pattern, but has a strong spring on the back of it, so that the contact is of the dead make and break order. Fig. 4 gives a sketch. Perhaps this is as good a place as any to inquire why it is no one has adopted the following plan of a contact breaker. It seems to me that it offers advantages and is fairly obvious. Under the rule mentioned above it is therefore necessary to proceed with caution. Every sparking arrangement at present has, somewhere in its makeup, a spring trembler to make and break the circuit rapidly. Now, it seems to me that if the breaking were done mechanically it would be much more reliable. If, for instance, in place of the usual notch in the De Dion contact breaker we had a small cam (Fig. 5) with a series of platinum or carbon tipped teeth on the end, with a contact piece C bearing against them, we should have an ideal mechanical contact breaker. The action will be something like the edge of a visiting card held against the edge of a rotating knurled edge wheel or a coin.

The Rigal car has a rear brake operated by side lever, which expands blocks inside the back brake ring instead of the usual band brake device. There is no compensating arrangement to equalize the strains on the two brakes.

An interesting novelty was shown by Calvert motors—a glass sparking plug which can be fitted to all the ordinary motors on the market. The advantage is that the spark can be seen by looking down through the plug endways even under compression. I asked if it did not often break and they said it did not, but I take it this would have to be proved. If the arrangement is durable it will be, of considerable advantage, as it is quite well known that a spark under atmospheric pressure and in the cylinder of a motor under a pressure of 60 pounds per square inch are two very different things.

Fig. 6 shows a neat handle bar switch for motor bicycles. It will be noted that the terminals A A are set in a red fibre casing B, into which slides a split metallic sleeve C, the edges D D of which do not meet within about one-quarter inch. When the circuit is broken the two terminals stand in the slot between the two edges of the sleeve. A slight turn of the sleeve makes the contact, while the sleeve can be readily pulled out and taken away when the rider is leaving his mount for the time.

Fig. 7 shows the R. Sovereign motor spark advance and exhaust lifting arrangement. The lever A is attached to the control rod from the handle bars, while the lever B, when the spark is fully retarded, engages the projection C on the side of the exhaust valve stem and thus lifts the valve from its seat.

Fig. 8 shows an interesting attachment for a motor bicycle, introduced by the M. G. Patents Company. It is a combined bicycle stand and luggage carrier. It also possesses the advantage that with it it is possible for the novice to get on his machine and learn how to manipulate it without leaving his own backyard. It consists of a frame A, something like half a camp stool, which is attached to the rear forks near the centre of the wheel. When the seat part of the camp stool is turned up it forms a luggage carrier near the usual position for such an article, and when turned about its point of attachment, as shown in dotted lines, it rests on the ground, raising the back wheel about 2 inches. It is so arranged that it does not interfere with the adjustment of the back wheel.

Steiners showed an interesting combination of a lamp and cycle horn. The light is in the cowl of the horn, and the vents for the sound of the horn are in the sides of the cowl. There does not seem any very great advantage in this combination, but it of course saves some weight. This firm also showed a motor horn with a swiveling cowl, so that the sound may be directed where required.

The Ormond motor bicycle possesses the interesting point of automatically oiling the crank chamber. The apparatus is controlled by the pulsation caused in the crank chamber by the movement of the under side of the piston. The apparatus, Fig. 9, is screwed into the crank case at A and communicates with the oil supply at B. The adjustment is effected by means of the right and left handed threads of the socket C, which alter the tension of the spring D. There are check nuts (not shown) each side of the central screw sleeve to keep it tight. The method of fixing the gudgeon pin of this machine is of interest. It will have struck anyone who has designed small engines of this type that it is very necessary to have some method of so fixing the gudgeon pin that movement is quite impossible. It will not do to trust to the walls of the cylinders for this work. I tried this method once, with the result of cutting a groove down the side of the cylinders. It is therefore necessary to employ some method of positively fixing the pin in position. The most usual is a cross pin of some sort, though in cases where a junk ring is used on the piston a loose sleeve A may be used as shown in Fig. 10. The method used on the Ormond cycle and shown in Fig. 11 is, however, the better of the two. It will be seen that a long pointed pin A is screwed down into the gudgeon

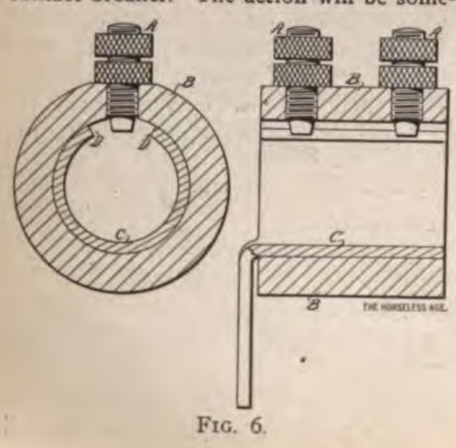


FIG. 6.

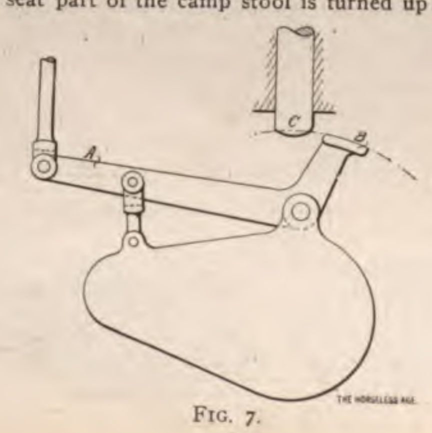


FIG. 7.

FIG. 8.

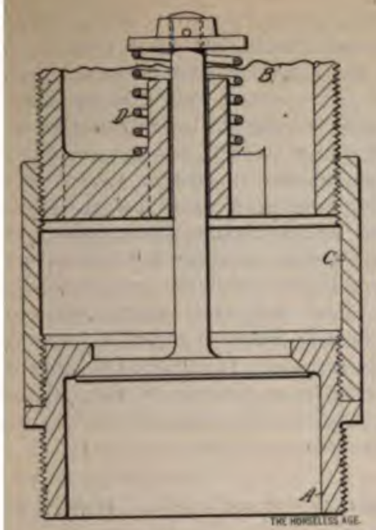
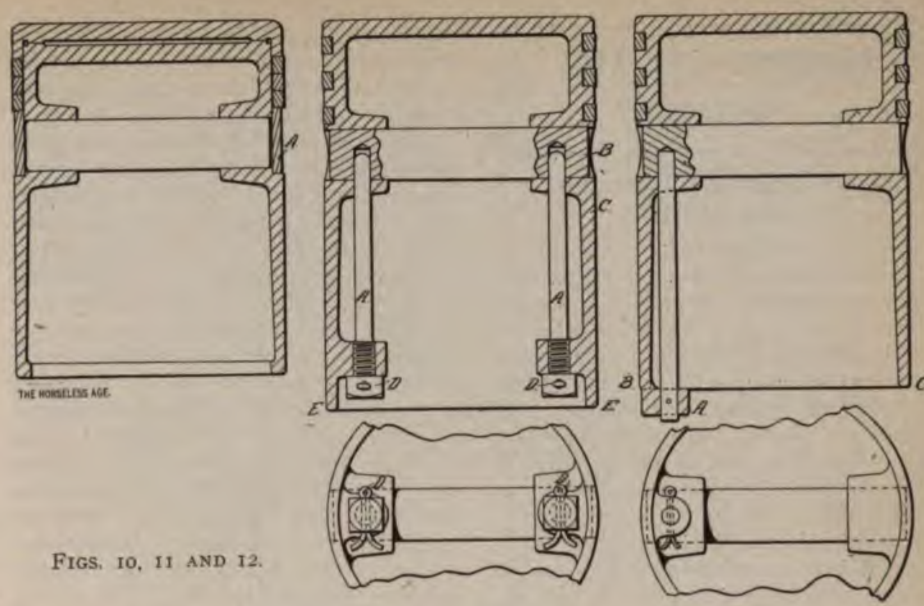


FIG. 9.



FIGS. 10, 11 AND 12.

B through its bearings in the body of piston C. That, however, is not enough. [In] a motor car engine everything that can [pos]sibly work loose will do so, and, as I [hav]e already said, split pins should be used [whe]rever possible. In the piston under [con]sideration they are passed through the [hea]ds of the screws at D, and, as these [hea]ds are sunk below the mouth E E of [the] trunk piston, it will be seen that this [pre]vents the set pins from rotating. I do [not] quite see the necessity for two set pins, [how]ever. My own method is to have a [sma]ll lug A cast on the piston, as in Fig. 12, [pro]jecting below the piston mouth B C, so [tha]t it is possible to bore a hole across it, [as s]hown. A split pin is put through this lug [and] the set pin obviates the necessity for [pip]ing at all. This Ormond also has a [gas]oline level indicator on the tank, con[sisti]ng of a float inside the tank connected [to a] needle traveling on a dial on the out[side] of the tank. The advantage of this […] as compared with a gauge glass is [that] the level can be ascertained in the [dar]k by the sense of touch when a gauge [glas]s would not be visible.

[T]he Minerva motor is about the only [cy]cle motor with a mechanically operated [su]ction valve (see HORSELESS AGE of [Feb]ruary 4 last). The same cam works [bot]h inlet and outlet valves, and as the cam [shaf]t is turning half the speed of the crank shaft, the cam comes in contact with the exhaust lifter three-quarters of a revolution after it has lifted the inlet valves, and operates it through a bell crank lever. The trembler (Fig. 13) of this machine is also novel. In almost all other cases the contact is made by allowing a projection on the contact maker to fall into a notch on the cam shaft. In this case a small projection on the cam shaft raises the contact breaker and forces it into contact, it being normally out of contact, as usual. This is probably the better arrangement of the two, as it insures at least one contact of the series due to the trembling of the spring being made with considerable force, and should any oil have reached the platinum point it is likely to be forced out by this pressure, which tends therefore to a good contact.

The sparking plug of this machine is also novel. Instead of using a heavy porcelain tube, which is always liable to be cracked by the heat, a porcelain insulator is ground into a metal case and held in place by the conductor in the middle, which is kept tight by a spring bearing against the porcelain head E. In the figure B is the porcelain and C D the metallic part of the plug, the dome E being porcelain.

Fig. 15 shows the carburetor of this machine, which is of the spraying type. There are only one or two points to be noted. The float control is of the usual sort controlled by weights at the top, which on lifting depress the needle and close the inlet. In the inlet is the gauze filter B. The gasoline on leaving the pipe N strikes the corrugated cone O and is, so to speak, rubbed into a spray. Additional air for starting purposes is admitted through U and the main supply through R. The spray carburetor has one advantage over the surface type, and that is that it enables almost any gasoline to be used, whereas the surface type will only use the finest gasoline, and even then requires to have the heavier oils, which this method of carburation always leaves in the carburetor, poured off from time to time.

FIG. 13.

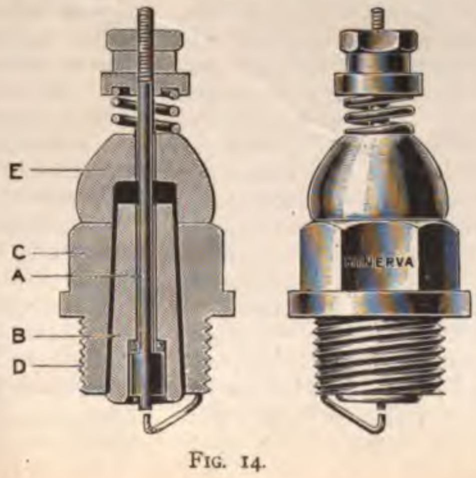


FIG. 14.

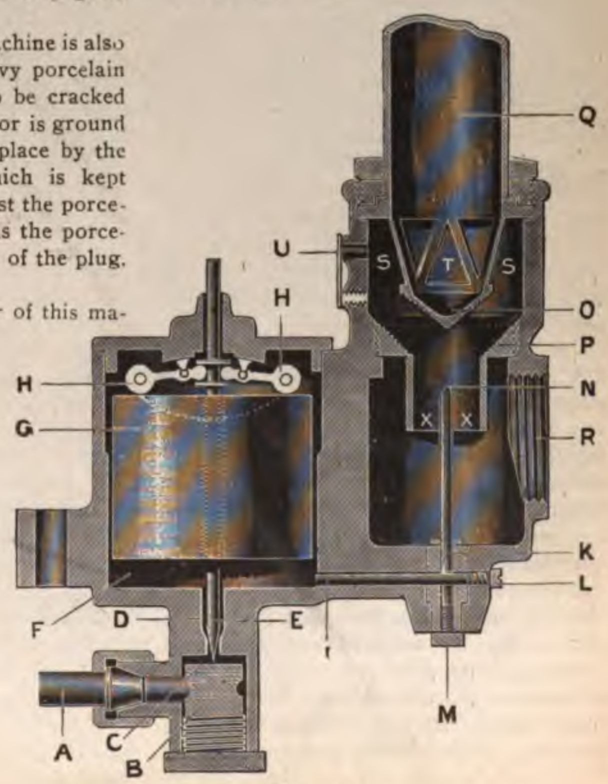


FIG. 15.

LESSONS OF THE ∴ ROAD ∴

Extracts from the Journal of a Moto-Girl.

(Continued.)

We now had a 9 horse power engine, where formerly we had 4½, so were anxious to see what she could do in regard to speed. We had taken short runs round town, but did not dare let her out, for fear of frightening horses. There were no speed laws then. About a quarter of a mile from our home there are 6 or 7 miles of State highway. But in order to reach it we had to go through the country, and the road was soft. However, we picked our way the best we could, until we came to an especially bad place, when we ran one wheel in the car track, as the ground looked firm there. It soon proved we were mistaken, as we went down like "McGinty to the bottom of the mud." It was a bad outlook for us, to say the least. A farmer came out of a house nearby and said: "Wall, mister, can I help you any?" I haven't got a 'hoss,' but will do what I can for you." So he went to the "barn" and got a crowbar, some planks and a shovel. In the meantime another man had offered his services, also a young man, who seemed very eager to help, which made Mr. F. smile when he thought of the weight of the auto compared with the size of the boy. But looks are deceptive, as the young man proved to be a perfect giant in strength, and was probably older than he looked, as it was he who finally got us out of the scrape. He took the crowbar and pried under the rear axle until Mr. F. could get two planks under the wheels. Mr. F. then started the engine and we shot out of there like a cannon ball. The incident furnished two evenings' work for Mr. F. and one man; but as Mr. F. would rather work around the machine than ride, it didn't bother him a bit. However, when out of sight of our benefactors Mr. F. turned to me and said: "There, you see; if you had been a man you might have helped me. A woman is no use when anything goes wrong."

I will now tell about some of our "hold ups," remembering this is not a woman's magazine, but a magazine for men who are only interested in actual experience. I will be as brief as possible, but you will doubtless see that we have had all that was coming to us. We were coming from Boston one moonlight evening when all at once we heard a grating sound somewhere and our engine stopped. On investigation Mr. F. found that the fibre gear that drives our dynamo was stripped, owing to some dirt getting into the teeth. On our make of carriage the dynamo was driven by a three-eighths inch round belt, driven from the pump shaft. Being a short belt and running so rapidly, Mr. F. had endless trouble with it breaking, and could not get anything to stand the strain. So he changed it over and sweat a gear on to the eccentric of the pump and drove by a fibre intermediate gear, which gave very good satisfaction. Next he had a spring bracket break. So he had to send it to a nearby factory to have it repaired. He had some hand forged stands made, and they had to be brazed on to the rear axle. Doing this job and changing over the dynamo cost about $270. As a friend of ours says, "If you say it quick it doesn't sound so much." It seems to me a shame that the manufacturers do not stand behind the carriages they build. I doubt whether today you can get them to guarantee them. In anything else, where a man gave $1,200 or more for an article, you would expect the salesman to say: "Now, if that isn't all wool and a yard wide when you get it home you can exchange for anything else in the store." Also, a manufacturer will ask you to deposit 20 per cent. of the value with your order.

Another trouble of Mr. F. was the irregular running of the engine at high speed. On running the engine slow she would take every explosion, but speed her up and she would miss explosions and not develop any power. He looked through all his back numbers of The Horseless Age, but did not see anything that would help him in his sad plight. He had planned a trip with a friend to the seaside, so they were bound to go. I was to go by train. Well, they started, and the engine commenced to make things interesting for them, missing explosions every time they tried to speed her up. They tried using less gasoline, but that did not work; then they tried running on batteries, then on the dynamo, and finally had to disconnect the dynamo. Then they put a new sparking outfit on, with no better results. At this time they were on a road not far from the railway, some 30 miles from home, and about 40 miles from their destination. They started at 1 p. m. and I at 2 p. m. I happened to be on the side of the train nearest the road, and "lo! and behold," there I saw my dear husband and his friend stalled by the roadside, dressed in their war paint and working under the blazing sun. I could hardly repress a little "Oh, what do you suppose the trouble is?" but instead I sat down and tried to look calm. They had planned to be at the hotel when I arrived, but it is needless to say they arrived some time later. They got started after a while, but the engine still missed explosions. They plodded along, however, and arrived all tired out at dark, the engine working very hard. After a good night's rest and putting some new batteries in, they started for home, the engine doing fairly well, although still missing explosions. They arrived safely. The next day Mr. F. decided he would have the manufacturer's agent come out and see if he could find the trouble. He came, looked the machine over, tried it, made a few suggestions, and went back to Boston, not forgetting to send us a bill of $5.

Mr. F. worked that evening until 11 o'clock carrying out the instructions of the agent. But when he had finished he found he was no nearer to having the trouble removed than before. So he wrote to the manufacturers, asking them to send one of their machinists, which they did. He tried the auto on the road and found that the exhaust valve stem was broken, which, of course, hung them up on the road. This proved to have been the trouble on the trip to Boston, for in taking the valve spring out it was found to be broken in two places.

A Winter Trip Under Difficulties.

By Harry B. Haines.

To every man who owns and operates an automobile, and especially to those who ride in the winter, there comes an experience sooner or later, which, to use a slang expression, "is a top notcher and puts all the others in the shade." That experience came to me this week*, and even now as I think about it I can scarcely repress a shiver and a shudder.

It often occurs to me that it is to be regretted that every narration of automobile experiences must be based essentially on incidents of trouble, for it is a well recognized fact that when an auto runs properly and without mishap there is nothing to tell about except the exhilaration of fast movement and the beauty of the ever changing scenery, a subject which, no matter how skillfully handled, is bound to prove a bit monotonous.

I have spoken from time to time to several automobile manufacturers about the good that is accomplished by spreading broadcast among automobile enthusiasts and would be purchasers the experiences of others, and have invariably found that they differed widely from me on this question. They seemed to think for the most part that the stories of trouble, such as most experiences are, have a tendency to discourage those who are contemplating the purchase of horseless vehicles. The "Item of Cost" propositions invariably met with the most caustic criticism, and these men who build machines all seemed to be of the opinion that the less the public knew about their make in particular and others in general, until after they had parted with their money, the better.

As a well known manufacturer said to me in a hotel at Springfield, Mass., during the New York-Boston Reliability Contest: "I don't see why the trade papers want to be stirring up these stories of accidents and troubles. No man learns much from another's experiences, and the only way for him to do is to buy a machine and find out for himself. He won't believe what he reads anyway, but after he gets in the game

* The article has unavoidably been held over for a number of weeks.—Ed.

learn more by actual experience than d from a hundred stories about what ed to other fellows."

st confess that I fail to see the mat- this light and I firmly believe that nothing of more real benefit to the bile user than a narration of the ac- mishaps and pleasures of his fellow sport. This spreading of knowledge doubt, result in less work for the nen and less activity for the manu- rs in selling duplicate parts and the their experts, but it is upon the user ore than the manufacturer that the of the auto depends, and it is only d just that he be given some chance money.

ht stray for an hour down this par- path of discussion without reaching objective point in this article, which late the occurrences and experiences mile automobile run through rain, e and slush, up hill and down, dur- ich the average speed was just less than 3 miles an hour.

l occasion early this week to go to 8 miles from my home, and as the ervice to this particular spot is poor I decided to make the trip in o.

route lay over the Preakness Hills, s of small mountains averaging 8 per cent. grades and being com- of a chain of hills and slight grades from 200 feet to half a mile in

day was a bright and clear one and ound was covered with between 4 nches of snow which had fallen on of ice caused by a rain earlier in k, which had frozen.

ided to start about 10 o'clock in rning, expecting to reach my des- in an hour or so at the least.

e starting out I made the usual tions against delays, and as I had nced some trouble with the patent suction diaphragm in my gasoline removed the old one and put in , and as a precaution took an ex- her along. This little bit of fore- ter stood me in good stead.

nd up the two rear wheels anew othesline rope, and after securing a blanket and lighting up a little ve I had purchased I was ready start. A friend to whom I had romising an automobile ride all but never found a chance to take nted to accompany me. When I hat we would be back home by 1 at the latest he climbed into the and I started off, glad of his y.

motor worked fine, and we sped the snow at a good rate of speed, for the outskirts of the city and ntry hills. Before getting out of stop was necessary at a grade to wait for a train to pass, and I ut the gears and took the oppor- tunity to tuck in the robe more tightly around me.

The gates were raised in due time, and speeding up the motor I brought the clutch lever forward to engage the low speed, and then the motor started to skip spark. I managed to work it up the slight grade, and the moment we were square on the railroad tracks it stopped for good and we were stalled.

A freight train was pulling up the tracks scarcely two blocks away, the gateman evidently having raised the gates, think- ing that we would go right across the tracks. I jumped out of the machine and changed the battery switch, putting another set on, and then turned the han- dle, expecting the motor to start at once, but it did not feel so inclined, apparently.

The freight engine was gradually draw- ing nearer with its deep chested puff, puff, and the gateman was getting excited, as was my friend. He had jumped out of the machine by this time, and at my order he ran around to the rear of the auto and pushed with all his strength. I joined in, and by our united efforts and the help of an accommodating spectator we managed to push the machine off the track.

The gateman was half way down the track, bent on flagging the train and pre- venting a catastrophe.

As the machine cleared the rails it start- ed down the grade on the other side of the tracks at a speed which was most alarm- ing, considering the fact that there was no one at the steering lever.

I tried to run ahead and jump in the auto, but the fates were against me and my feet slipped. I landed with a crunch prostrate in a drift of dirty snow piled up by the trolley sweepers, while the auto plowed into the same drift 30 feet down the street and stopped short in its truant career.

My friend, who had been hanging on to the back of the machine in a vain effort to stop it, stood clinging to one of the rear wheels, as if expecting that the auto might decide to start again. His face expressed a most humorous combination of conflict- ing ideas and passions, and, despite my own plight, I could not help laughing at him.

Having dug the snow out of my ears and emptied it from my coat sleeves I walked down to the auto and started look- ing for trouble. An examination of the battery connections proved that they were all right, but the ground wire, which is screwed down to part of the iron frame, had dropped off, the screw which held it in place having been lost. I found another screw after ransacking the tool box and connected up the wire, with the result that the motor started off again at the first turn.

We climbed in and arranged our robes, and a moment later were on our way again rejoicing. Everything went well for the next mile or so, until we reached the first heavy up grade, which was a winding road up the side of a small mountain. The first climb was about an 8 or 10 per cent. grade for possibly 400 feet, and then it gradually sloped off to a 5 per cent. climb; at least, that was the testimony of our gradometer. The high winds of the night previous had blown the greater portion of the snow from the road, but it was still covered with a smooth icy coat which made the climbing proposition look a bit dubious.

We started up the grade on the low speed and went along famously for about 50 feet, when the machine suddenly slowed down despite the fact that the engine was running at a good rate of speed and the clutch seemed to be holding, and the next moment we started to slip backward. I told my friend to jump out and give the machine a push, which he did; but this did not seem to make much difference.

The auto was steadily sliding backward, and in a few moments we were at the foot of the hill again. I threw off the power and got out, and from the way that the rope binding on the tires was cut I felt sure that the driving wheels had been do- ing their full duty.

There was a slight gully on one side of the road, which, although partially filled with snow, seemed to have escaped the ice, and I decided to try the grade again, run- ning close to this gully, so that two of the wheels ran in it. With my friend out and pushing, I started again and mounted half way up the grade in good shape, but stuck again at the steepest portion, the wheels spinning around and just holding the car- riage from going backward, but not forc- ing it forward an inch.

For a second or more we stood this way and then I threw one of our two blankets out to my passenger, with instructions to throw it under the wheels. Luckily he did so without asking questions, and our down- ward passage was stopped. The blanket gave the wheels a hold, and we started up- ward and managed to get over the crest of the hill, where I was glad to stop for a moment.

Despite the fact that the day was cold the motor was overheated by its hard work, and the cooling water was boiling, a long trail of steam pouring out of the overflow pipe.

I thought it advisable to cool the cylinder a bit before continuing, and we accom- plished this by opening the water tank and forcing lumps of snow and portions of long icicles (which we knocked off the fences) into it, with the result that in a short time the water was thoroughly cooled.

This stop caused a delay of about fifteen minutes and without further loss of time we climbed into the machine, and, having started the motor, continued on our way.

We had no more really bad up grades going to our destination, but there were some good down hill runs. It was while running down one of these hills that I met with an experience, I might even say an ac- cident, which I consider the closest call I

have ever experienced, and why my friend and I were not severely injured is more than I can say.

We were speeding down a long ice covered hill, going at about 15 miles an hour. I kept the horn tooting, as we came to a very gradual curve, and we had just rounded this when I saw a team of horses attached to a heavy sleigh coming up the road.

The horses were evidently frightened, and the driver stood up and raised his hand to us to stop.

I instantly jammed on the brake which applies to the motor and at the same time applied the emergency brake which acts on the differential. Under ordinary conditions the machine would have stopped short, but quicker than I can tell it we skidded and whisked around on the icy road and the next moment we were sliding backward toward the team, which was scarcely 100 feet away, both horses rearing and plunging.

A hundred thoughts crossed my mind at once as I realized in that awful second that I had no control whatsoever over the machine. Scarcely thinking what I did I jammed in the low speed gears, as I sat waiting for the crash which seemed inevitable.

As the low speed went in the machine again swerved, and this time to the right, and with a jar which shook me in every bone we dropped into a snow filled gully at the side of the road, and I sat as one dazed and saw the team go crashing past up the hill, their hoofs slipping and smashing over the icy road.

My friend, who seemed to have more presence of mind than I, was out of the machine by this time and I followed him a moment later, feeling a bit weak in the knees.

Neither of us spoke for a minute, and then my companion broke the silence by remarking: "That was a rather close one, wasn't it? Don't you think we had better get to work and haul this thing out on the road again?"

I thought we had, and then I started to look around and see just what damage had been done. The low speed clutch was still engaged and the battery switch was on, but luckily, for some reason or other, the motor had stopped.

A glance in the battery box told the story, for there was scarcely a wire connection intact, the jar of the fall into the gully having broken the majority of the wires, as the battery cells had not been properly blocked to prevent their jarring.

It was no pleasant job with cold hands to make new connections, and I was in no amiable frame of mind, expecting the driver of the team to return any moment and tell me what he thought of such running, but he apparently had seen all of me that he wanted to, for he did not come back.

It was half an hour's job to straighten out the batteries, and this once done I started the motor again and tried to make the machine pull itself back on the road. I soon found that this was futile, and then my companion helped earn his passage by getting a fence rail, with which he pried on the rear axle. I stood beside the machine and engaged the low speed, at the same time pushing with all my strength, and finally, inch by inch, we worked the auto out of the hole and on to the road again.

The snow in the gully had saved the machine from serious injury, and as far as I could see, beyond our scare and the battery connections there had been no damage done.

We started off again and finished the remaining 3 miles of our trip without further mishap, arriving at our destination at 1 o'clock, having been three hours in covering the 8 miles.

We left the machine under a shed while we went in to dinner and transacted the business on which we had come, and an hour and a half later we went outside to prepare for the trip home.

It was raining at this time and there were flurries of snow, which made the prospect of an 8 mile run over country roads none too inviting. To add to our troubles, the motor refused to start, despite five minutes or more turning, and it was then a question of another hunt for trouble.

I took a wrench out of the tool box to remove the spark plug, and, being unable to work with my heavy leather gloves on, I removed them. Instantly the cold iron stuck to my fingers whenever I touched it, and I never remember having had a harder job to get a spark plug out. I finally succeeded in removing it and found that it sparked all right, and then I inspected the gasoline feed.

By removing a plug from the overflow I found that the hand pump did not work, and upon dissecting it I found the trouble. The patent leather sucker had frozen stiff, so that it did not work, and consequently no gasoline was pumped into the explosion chamber.

I put in the new leather that fortunately enough I had brought with me, and upon connecting up the pump I found that the motor started without the slightest difficulty. It might be timely to say at this point that the manufacturers of the type of machine I own intend to put a carburetor on their 1903 type and do away with this pump.

The rope binding on the rear tires had been almost all cut off during the trip, and before starting for home I secured new rope and bound the tires up again. It was about 3 o'clock when we finally got started on the return trip, and even with the top and storm curtains up we were none too dry. It had grown considerably colder and the roads had a new coat of slush which was rapidly changing into ice, even as we rode along.

It was low gear work most of the way, and we mounted the first few grades without trouble. We finally came to a steep slope and the old story of wheels slipping was repeated. The top and storm boot held us so that we could not get out of the machine easily, and it was a case of backing down to the bottom again. We did this by keeping the machine in the road as well as possible, and when we finally stopped down went the top and we both got out. From that time on it was a case of get out continually, and the road was liberally sprinkled with fence rails which we appropriated at various points to use as pry bars.

We finally got up the hill, both walking, the low speed in and the passenger helping things along with his ever ready fence rail. Again we climbed in, our clothes caked with ice, the combination of rain and snow having frozen on us everywhere it touched. Our feet were fairly soaked, as neither of us had expected to do so much foot work.

By the dint of hard work we finally reached the last steep grade coming into town, and this was the same spot where we had stuck coming up. The hill was a smooth sheet of glass, and I hesitated, fearing to try it and dreading to lose control of the machine again as I had done once before.

It was dark by this time, the snow was blinding, and I held the low speed gears in slightly, just enough to give the machine a start, and we were off. Both brakes were on and I let the machine travel at a snail's pace, continuing this until the worst part of the grade had been passed.

Even then I dragged slowly along down the remainder of the hill, and then cut out the slow speed and went on. We had no further mishaps and reached home about 7 o'clock, cold, tired, wet and hungry.

Trade Literature Received.

The 1903 Meteor Steam Cars.—The Meteor Engineering Company, of Reading, Pa.

Hart-Parr Gasoline Engines.—Hart-Parr Company, of Charles City, Ia.

The Lens Mirror Headlight.—Rushmore Dynamo Works, of Jersey City, N. J.

The Tool for Quick and Accurate Boring.—The Binsse Machine Company, Newark, N. J.

Air Pumps and Appliances.—Gleason Peters Air Pump Company, Houston and Mercer streets, New York.

The Manville Fire Extinguisher.—H. W. Johns-Manville Company, 100 William street, New York.

The Kenosha Auto Jack.—Kenosha Jack Manufacturing Company, Kenosha, Wis.

Universal Milling Machines.—Garvin Machine Company, Spring and Varick streets, New York city.

Pardee & Co., Chicago agents of the Packard Motor Car Company, will have charge of the company's New York business also.

BEGINNERS PAGE.

The Electric Motor.

THE FIELD MAGNET.

The field magnet of an electric motor may be made in many different forms, the horseshoe shape shown in the diagrams of the last instalment being one of the simplest forms. The horseshoe field magnet has only two field poles, but motor fields may be made with any even number of poles. A two pole field is best suited for high speed motors and a "multipolar" field for slow speed motors. In order to be able to gear electric motors directly to the driving wheels of the car they must be of comparatively low rotative speeds. The majority of electric carriage motors are geared direct to the wheels and axles, although a few are geared with a double reduction. The latter are, as a rule, two pole machines, while the former are generally four pole and sometimes six pole machines. Altogether the four pole motor is the most

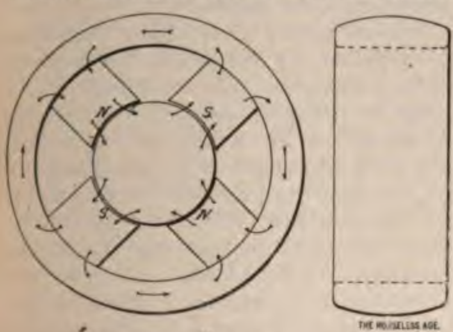


FIG. 1.

common type of carriage motor, and in the following we shall deal particularly with this type.

Another condition which determines the shape of the field frame of an automobile motor is that the motor must necessarily be inclosed, dust and moisture proof, and that the field frame may at the same time serve as part of the casing for the motor. These considerations have led to the practically uniform adoption of the type of field frame illustrated in Fig. 1, which is known as the multipolar, ironclad type. The arrows in this figure indicate the paths of the magnetic lines, and it will be seen that

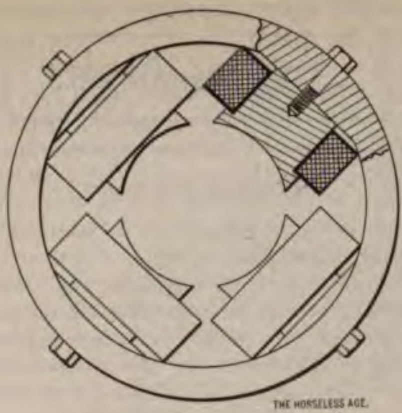


FIG. 2.

there are four distinct magnetic circuits, the poles adjacent to each other being of unlike sign. The field is made either of cast steel or forged iron. The iron has a greater magnetic value than the cast steel and permits therefore of making the frame lighter. Ordinarily the field ring with the poles is made in a single piece, but sometimes the poles are made separate and bolted to the field ring (as shown in Fig. 2). In that case the poles are made with enlargements or pole shoes at the armature end, which reduces the magnetizing force required to force the magnetism across the air gap into the armature. If a field frame made in one piece was provided with such pole shoes, the field magnetizing coils could not be slipped over the field poles.

Each of the four field poles is provided with a spool of wire for magnetizing purposes. The spools of wire, called the field coils, are connected to each other in such a manner that the current flows through all of them in succession, and in opposite directions in adjacent spools, so as to make adjacent poles of opposite sign. The spools on which the wire is wound are thoroughly insulated with hard fibre, linen, shellac and, perhaps, asbestos; the wire itself is insulated with cotton.

THE ARMATURE CORE.

What was referred to as the "drum" in the description of the models is technically known as the armature core (Fig. 3). It is built up of thin, circular, annealed sheet iron stampings (Fig. 4) upon a central armature shaft. The sheet iron stampings or "armature disks" are shellacked or varnished on both sides before being assembled on the shaft, so as to make but poor

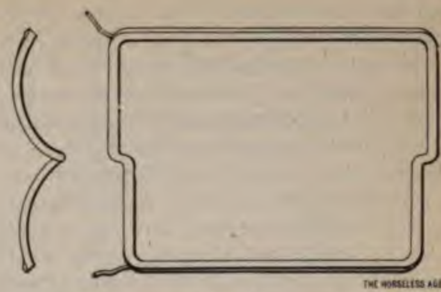


FIG. 5.

metallic contact with each other, the object being to avoid the production of waste currents (or eddy currents) in this core when the motor is in operation. All around the edge of the armature disks are stamped out slots to receive the armature coils. The object of placing the coils in slots of the core instead of on the surface is twofold. In the first place, when the motor is in operation there is a tendency for the coils to move circumferentially on the core, and by placing them in slots they are securely held in position. Secondly, the iron of the armature core is brought nearer to the iron of the field frame than would be possible if the armature coils were placed on the surface of the core, and hence the air gap to be traversed by the magnetic lines is shortened, which saves in magnetizing force required. The slots are thoroughly insulated with troughs of mica and the coils are then put in place. The number of slots depends upon the voltage of the motor and other considerations. In order to make the motor as compact and light as possible a smaller number of slots are used than is customary in stationary motors of the same voltage and power. Forty-five slots are not uncommon for an 80 volt carriage motor. Referring to Fig. 3, it will be noticed that the sheet iron disks are clamped by circular end plates P P (of bronze) and a collar and nut on the shaft. A key K on the shaft prevents the core from turning thereon.

ARMATURE COILS.

The armature coils are at present always wound on a form, shellacked (or treated with some insulating varnish) and baked before being placed on the core. They are therefore all exactly alike. In a two pole motor each coil is placed in slots exactly or very nearly opposite each other, but in a four pole motor the two branches of a coil are placed in slots at approximately a

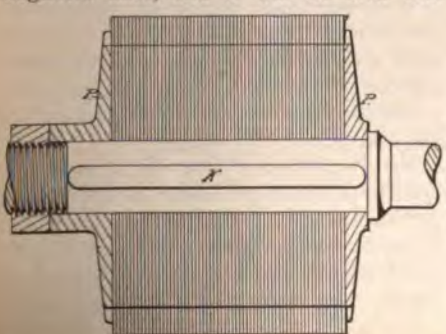


FIG. 3.—SECTION THROUGH ARMATURE CORE.

FIG. 4.—ARMATURE DISK.

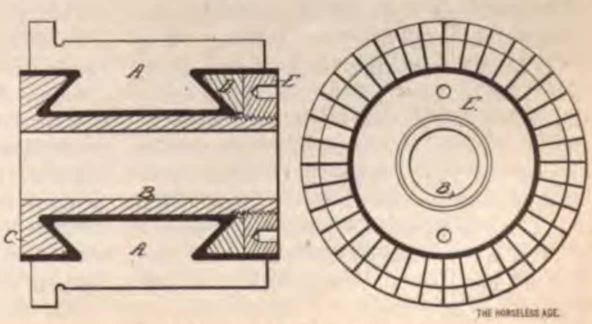


FIG. 6.—THE COMMUTATOR.

quarter circumference with each other. One part of the coil is thus in front of a north pole while the other is in front of a south pole. Fig. 5 shows the approximate form of the coils before they are placed on the core. The armature coils are made of copper wire insulated with cotton.

The armature coils of a multi-polar armature may be connected up so as to form either a parallel winding or a series winding. With the former, four brushes or sets of brushes are required on the commutator, spaced evenly around it, while with the latter only two brushes are required, a quarter circumference apart. In a parallel winding the end of any coil is connected to the commutator segment adjacent to the one to which the beginning of that coil is connected. In a series or two circuit winding the end of any coil is connected to the commutator segment opposite the one to which the beginning of that coil is connected. Series wound armatures are the most common.

THE COMMUTATOR.

The commutator, as already explained, serves the purpose of leading the current into the armature coils and reversing its direction of flow in them at the proper moment. As seen in Fig. 6 it consists of a number of copper segments A assembled with strips of mica between them and clamped on a sleeve B between a head C on the sleeve and a washer D and nut E. The segments are assembled with the mica insulation between them, are compressed in a clamp, bored out, and have the two ends counterbored to a bevel surface. The inner sides of the head C and the washer D are turned to the same bevel, and the segments are then clamped on the sleeve with mica between the segments and clamping parts at every point, as shown in the illustration by the heavy black lines. When completed every one of the segments is perfectly insulated from all of the other segments and from the sleeve. The number of segments in the commutator is the same as the number of slots in the armature. The commutator segments are made with lugs at one end, and these are slotted and have the terminals of the armature coils soldered into them.

Automobile Accidents.

It is reported that an automobile delivery wagon belonging to a New York department store and housed at 283 Morris avenue became ignited at midnight on March 18 and was totally destroyed.

On March 15 an automobile occupied by Mrs. Chas. Rinard and Charles Spigelmire skidded against the curb and overturned at Braddock, Pa. The machine was seriously damaged and the occupants received painful though not serious injuries.

The automobile of Dr. Henry C. Buswell collided with a trap in Buffalo, N. Y., on March 15 and Joseph Ruprecht had his leg broken. The cause of the accident is *ascribed* to fog.

..COMMUNICATIONS..

Flywheel Formulæ.

READING, Pa., March 16.

Editor HORSELESS AGE:

Permit me to call attention to an evident error in Mr. Stoddard's statement on page 340, issue of March 11, regarding the weight of flywheel for twin cylinder engines. He says: "If we have a twin cylinder engine with the explosions following each other immediately * * * the two successive strokes accumulate their power, and a flywheel of double the weight of that for a single cylinder would be required." This statement would be true if the two explosions were simultaneous, for the result then would be the same as that of a single cylinder of double power, but since the explosions follow immediately, they occupy two half revolutions out of a total of four and therefore apply power during half the time, the same as a single cylinder two cycle engine of double size running at half the speed. It is quite evident that the same amount of flywheel would not be required for a two cycle motor as required for a four cycle, and if two successive strokes accumulate their power, then three successive strokes would accumulate more, while four, as we know, would be a constant application of power and require almost no flywheel at all. A further proof of the pudding is in actually trying. During '95, '96 and '97 we built vehicles with twin cylinder motors, while from '91 to '94 they were built with single cylinder motors, and a vast difference in the amount of vibration was noticed when the change was made. The use of twin cylinder motors today is quite common and the reduction in vibration forms one of their strong points, which although not nearly so noticeable is if opposed, is better than having a single cylinder of same power.

CHARLES E. DURYEA.

[We believe that a double cylinder engine in which the two explosions follow each other in successive strokes should have about 50 per cent. more flywheel capacity than a single cylinder engine of the same cylinder dimensions. For the purpose of a simple demonstration, let us assume that the energy of explosion is transferred to the flywheel instantaneously. Then, as the first explosion occurs the speed of the engine jumps up a certain amount, drops gradually until the second explosion, when it again rises, to a higher point than at the first explosion. This is the point of maximum speed. The engine runs at minimum speed just before the first explosion occurs. Hence maximum and minimum speeds are exactly three strokes apart. In a single cylinder engine these points under the same conditions would be exactly four strokes apart. The two cylinder engine would, of course, develop twice the power of the single cylinder, and if we take the torque of the single cylinder engine as a unit the flywheel of the single cylinder engine would have to maintain this torque for four strokes, which would require, say, four units of energy. The flywheel of the double cylinder engine would have to maintain twice that torque for three strokes, which would require six units of energy. Now if the fluctuations in speed are to be the same the two cylinder engine would require 50 per cent. more flywheel capacity than the single cylinder.

On the same supposition a two cylinder engine with explosions occurring at equal intervals would require no larger flywheel than a single cylinder engine of the same bore and stroke.—ED.]

The Automobile as a Gas Engine Flywheel.

Editor HORSELESS AGE:

Your thoughtful editorial of March 11 suggests a subject which, it seems to me, should receive further theoretical and experimental investigation.

The authorities give certain coefficients of variation for designing flywheels for various purposes. The steadiness of running is, of course, more or less affected by the work to which the engine is coupled, and where the engine is directly connected to a dynamo the armature is taken into account, I believe. A resilient member has been introduced between the engine and armature with gas engines.

In automobile engines I should expect the average coefficient of variation used in designing the flywheel to be about .05, though I have known of less than .03 being used. The coefficient should, of course, take into account the connection with the vehicle. If the entire carriage is to be included in the calculation, the connections should be rigid, which is far from being the case. Undoubtedly the tires give with each impulse of the engine, as do also the intermediate parts, and it would seem probable that the endurance of the tires, axle, chain and intermediate parts generally is materially affected by the coefficient of steadiness adopted in designing the flywheel.

A variation in the speed of the vehicle of even 1 per cent. five or ten times a second would seem calculated to soon produce a feeling of weariness, notwithstanding the results of the recent investigations of the Chicago scientists in reference to the vitalistic effects of vibration.

No very great variation between the relative angular positions of the driving and driven part would be necessary even if we take a coefficient of .05 and consider that the variation is entirely in the flywheel. I calculate that at the normal speed the angular position of the engine shaft would not vary more than from 1-40 to 1-20

olution from its medium position, the driven parts.

connections are rigid, the vehicle eceive the greater part of the im- the explosion; if there is sufficient y, the flywheel absorbs it almost ely. E. J. STODDARD.

Boiler Incrustation

HORSELESS AGE:

a reader of your valued paper and taken note of some oft repeated its, I am reminded of the saying of llings that "it is better not to know than to know so many things that " I am referring especially to the statement that in a boiler in which a strong circulation no scale or will be formed. I herewith offer section cut from a Roberts water iler which shows the pipe to have arly closed by a scale deposit as iron, which cannot be dissolved by inary means. Some of the tubes of ler were entirely stopped up. As ling occurred in the main tube, he circulation and the heat are the , it amply disproves the above it, especially as this water is known purest public water in the State. public yacht Rewona, on which a iler was installed this spring, had the 2 inch tubes in the centre of er filled entirely solid with scale son, and these facts agree with all ervations since 1880, when I placed made Herreshof single coil boiler e first steam wagon running gear tate. FRANK WILLIAMS.

tions to Avoid Possibility of re on Gasoline Vehicles.

READING, Pa., March 13.

HORSELESS AGE:

Morrison's second fire, due to an al spark near the carburetor, eem to indicate the value of hav- gasoline tank and the mixing de- ar removed from the motor, muf- sparking device as possible. It is account that we adopted a de- ich places the tank and mixer not front of the motor but below ng else, so that no heat from the liable to cause evaporation can e gasoline, and any leak or vapor the ground instead of near to or rts likely to ignite. Many vehicles structed with fuel tanks by the or over the motor or muffler, and vibration sooner or later is likely a leak in the fuel tank the possi- fire from such leakage is ever and in many cases the location tank is such that the fire once would be impossible to stop until ents of the tank had been burned. ccidents of this nature have been the past, as the vehicles now in me older the effects of vibration and corrosion will become more evident, so that danger from this source will increase with the age of the machine. The good will of the public toward motor vehicles depends largely upon their freedom from danger, and on this account this phase of the matter should not be neglected. Not only should tanks be of good material and properly put together, but since almost any part will fail some time or other, the placing of the tank should be such that the greatest possible freedom from danger is secured. A leak from a tank upon a hot part will evaporate and probably not attract attention, whereas the same leak falling upon the floor will be seen at once and remedied. The gasoline tanks therefore should preferably be placed with nothing else under them.

CHARLES E. DURYEA.

Railway versus Steel Roadway.

Editor HORSELESS AGE:

There is a small town of probably 2,500 people about 21 miles from this place, and the business men and planters are offering a bonus of $50,000 for a railway or electric line connecting here.

What would you think of their investing their money in a steel roadway and motor trucks, and charging toll for other vehicles which use it?

It seems to me this would be a more sensible plan than that which they pursue, and I am sure not so expensive.

What would be the probable cost of 21 miles of the steel and at least four wagons of 5 to 10 tons capacity?

I have been very much interested in motor trucks and I see no reason why this kind of work would not be in their field.

C. E. BASSANO.

[An opinion as to the superiority of a railway of the usual type or a steel roadway can hardly be given without a thorough study of the local conditions. It seems, however, that the conditions for the success of motor trucks are very favorable in this case. The cost of the steel for a 21 mile roadway would probably be about $60,000, the total cost of construction of such steel roadways being estimated at $4,000 per mile. A 5 ton truck costs in the neighborhood of $5,000.—ED.]

The Doctors' Number—Muddy Roads in Ohio.

Editor HORSELESS AGE:

I heard many favorable comments regarding the Doctors' Number, and I think it had a good influence upon a number of physicians in this city, for they are beginning to seriously consider the automobile for their business. It took me several weeks, but I read every article and enjoyed every one of them, especially the poem. And the best part of all is that these are the experiences of men in the practical use of the automobile in a business where a machine has to be well built in order to endure the test over all conditions of road in all conditions of weather. A few weeks ago I had my machine all apart, engine and all, and thoroughly cleaned and adjusted. After 4,000 miles usage, the bearings, cylinder and rings, and gears were not perceptibly worn, and now the machine is running better and smoother than it did when new. I have never seen the roads in this section of Ohio worse than they are this spring. In some places they are almost impassable for light horse vehicles. On some of our streets I have been ploughing through mud 6 and 7 inches deep, and sometimes clay at that.

W. WEBSTER ENSEY.

Fuel Consumption Query.

Editor HORSELESS AGE:

Can you tell me approximately how much less gasoline will be consumed by a 4 horse power gasoline engine running at normal speed than by an 8 horse power engine throttled so as to develop only 4 horse power and running at the same speed?

T. E. TAYLOR.

[We should judge about 20 per cent. less if the engines and carburetors are identical except as to size. Otherwise the proportions might be entirely different. The 8 horse power motor running at half load at full speed would be less efficient than the 4 horse power motor at full load, owing to the greater loss of friction and the lower compression. No very close approximation can be made, however.—ED.]

Explosion Engine Query.

Editor HORSELESS AGE:

Will you tell me through your paper the object of injecting kerosene into the cylinder of a gasoline motor while it is still warm?

N. D. HOLBROOK.

[A resinous residue is left on the cylinder walls and the piston rings by the combustion of gasoline. This sticky residue interferes with lubrication and causes the piston to move less freely in the cylinder. Kerosene will dissolve this resinous matter, and the more freely if the cylinder is still warm. The object of injecting kerosene is, then, to clean the cylinder walls and piston rings of this residue.—ED.]

Auto Legislation in Kansas.

LEAVENWORTH, Kan., March 15.

Editor HORSELESS AGE:

I inclose a copy of the automobile bill just passed by the Kansas Legislature. Kansas has set a standard of liberality and fair dealing to automobilists that other States should profit by. The prosperous Kansas farmer has not only added the piano as a household necessity, but is now acquiring the automobile. The bill, as first introduced, was extremely savage, as you will see by the clauses worked out, but after several trips over to the capital and with the active aid of Senator Hemley, himself an auto enthusiast, the bill with the

liberal provisions went through. We also secured an appropriation from the present Legislature providing for the construction of good roads by working of convicts.

D. R. Anthony, Jr.

[An abstract of the law appears under "Legislative and Legal" in this issue.—Ed.]

Proper Liveries for Chauffeurs.

Editor Horseless Age:

I am at present operator for a gentleman of this city, and I would very much like to know what would be the proper clothing outfit for touring this summer so as to be right up to style. Would you please give me the desired information, and oblige J. H. S.

[There is no livery recognized as a standard in this country. The regulation winter costume consists of a leather coat, trousers and leggings. A New York house makes a livery consisting of a black leather coat, cut long, with trousers and leggings to match. For summer wear serge, whip and khaki are quite popular, because they are lighter and cooler.—Ed.]

Thinks the Present Tonneaus Uncomfortable.

Editor Horseless Age:

I have been a subscriber to your journal for the past three years, and have noted with great interest the development of the automobile. My occupation in life has been such that I have developed a degree of criticism of other men's doings that may have caused me to lean somewhat to the side of the fault finder, which of a truth is not an enviable position, especially in these days of great and new things.

However, I am disposed to venture a few remarks with respect to certain characteristics of one type of "up to date" automobile, which have worried themselves into my mind and which I hope to see eliminated some day; for I am a great believer in getting as much comfort as possible out of life.

The automobile generally is a fair weather vehicle; that is, presumably no one goes to ride for mere pleasure in stormy weather. The automobile is also a warm weather conveyance, especially the much in evidence "touring car" (which, by the way, in some instances resembles more a newly painted dray than it does a carriage, with its tonneau and other hideous trappings clothed with French names to ameliorate their ugliness). This particular vehicle was made for the rich to go touring the country with, and the rich don't tour the country in stormy or cold weather. The Pullman car and a closed carriage are good enough for them under such circumstances.

So, then, the touring car is purely a pleasure affair, and if so the one who owns *it expects* pleasure when riding in it. True, the aristocrat would once undergo any amount of agony for the sake of style, but that is so no longer. He, like all other well balanced human beings, is looking for comfort.

To the point, then—Is the touring car a comfortable thing to ride in? Let us look a minute.

I saw one of these "red devils" going along the main street of my town the other day, having as occupants a very fat aristocratic Chicago packer—you know pork packers are always fat—and a chauffeur of the imported variety. The street is paved with stones, which I presume were blocks once, but long ago took the shape of the moon. Well, you should have seen the vibrations of that Chicago packer who was sitting in the tonneau. Poor fellow, he was bouncing around and quivering like a bowl of jelly; and, although I was not near enough to hear, I imagine he heaved a sigh of relief as the dray stopped at his branch house, where he is in fierce competition with other packers to keep down the price of food products.

And what caused the bouncing and quivering of this large hearted Chicago packer? The rear of the seat of that tonneau had the same ratio to the breadth of that packer as one bears to four, and if it had not been for the curved sides of that tonneau, which fitted just one-sixth part of the packer's circumference, there would have been a tragedy. And the space in that tonneau for that packer's feet—my, what an area for so great an underpinning of one carrying the burdens of the common people. Talk about comfort—do you call that comfort? It was a cool day, too.

Suppose the thermometer had been at the wilting point, as it is apt to be when the packer goes touring in God's glorious country. How delightfully "hot" that packer's pedal extremities would have been in that airtight tonneau with its heating muffler underneath. And suppose Mrs. Packer had been there, too, and Miss Packer and some other Packers. I am sure the packing industry would then have been truly represented.

But things that are packed are apt to spoil, in hot weather especially, and if our ambitious automobile manufacturers don't arrange some more comfortable hull for their road engines than the present tonneau of the touring car, their business will spoil also, and Chicago packers and all the rest of the aristocrats will return to their comfortable carriages drawn by beasts with unlawful tails.

Make the touring car comfortable. If this particular type of automobile was designed for the wealthy, don't persist in making a sardine box to hold five, but rather make the seating accommodations nearer in proportion to the breadth of the passengers; have the vehicle carry a less number, and ask the rich man to buy more cars, if he has a large family. It is comfort he is after, and he is willing to pay for it when he finds it. In this way the buyer would be satisfied, and the business of making automobiles would be enhanced.

Jean Hanson.

The Serpollet "Self Starter."

Editor Horseless Age:

I wish to make known to you the interest I find in the articles of your correspondent, J. S. V. Bickford, which you publish from time to time, and express the hope that he will continue to keep us posted in the progress of this special branch of steam engineering. Up to the last issue of your paper received he does not tell us what has become of the Serpollet "self starter." All we know of this is a line diagram on page 112, issue of January 22, 1902, and as yet we have no drawing which shows its proportions or how that piston is kept steam and air tight.

Steam.

[The device mentioned was referred to in the instalment of Mr. Bickford's article on the Crystal Palace Show in our issue of March 4, which had probably not yet reached our correspondent when he wrote the above letter. Mr. Bickford states that a spring is used in this device, while originally compressed air was employed. We have no particulars of the design of this device.—Ed.]

N. A. A. M. Meeting.

A special meeting of the members was held on March 18, its purpose being the consideration of change in the constitution and bylaws. A number of unimportant changes designed to bring the different questions into harmony and to remove some slight inconsistencies were carried through.

The special meeting was immediately followed by a meeting of the executive committee.

A suggestion to hold a single show in New York was made and received some attention. Some members favored such a course, others opposed it. A committee was appointed to consider the entire matter and a report will be made at a future meeting.

The question of making a creditable American display of automobiles at the St. Louis Exposition was discussed. President Budlong explained that the number of replies from members on the matter of exhibiting indicated that there was a very good prospect of the efforts being crowned with success. He explained that patriotic motives, if nothing else, should actuate members to exhibit, as it would not do to let the French makers have the only respectable exhibit. The association is outlining a plan for lessening the expense, while at the same time enhancing the benefits to be derived from the exhibits. The N. A. A. M. proposes to engage space at St. Louis and to look after the exhibits after they are installed, so that the cost to individual manufac-

be extremely low. Attendants
ovided, but exhibitors, if they
y have their own experts in at-

nittee was appointed to con-
entire chauffeur question. A
firms were elected to member-

A. C. A. Meeting.

ussion on automobile legislation,
been announced for the club
n Tuesday, March 17, was for
on postponed. There was only
tendance at this meeting, which
ed over by W. E. Scarritt in the
President Shattuck, who was
any in connection with the pend-
obile legislation.
to spend the evening profitably
tt had paper slips passed around,
the audience were requested to
tions which they wished to have
Most of these questions were
by the chair, who then also called
udience for a discussion of the
Many questions were thus pro-
answered, and the discussion
a lively turn.
the end of the evening the pro-
mation of a chauffeurs' club
ht up for discussion. It is the
those who are promoting this
he Automobile Club of America
e to the chauffeurs graded cer-
cording to ability, honesty, so-
Mr. Scarritt in introducing the
d that there was no question of
g a need for some means of
owners of high priced touring
curing competent and honest
He enumerated some of the
mmonly practiced among chauf-
utlined in our last week's issue,
that he knew of several gentle-
were disgusted with the automo-
just on account of their ex-
with the chauffeurs. That en-
h of the automobile business
upies itself with the construction
iced touring cars is vitally in-
this question of competent
If the proposition can be car-
a practical manner it certainly
taken up by the club.
the gentlemen present related
the experiences he had had
chauffeurs, both French and
He had had about fifteen of
ar, and had always paid them
ut twelve of these had been en-
tisfactory, both as regards hon-
briety. Mr. Gallaher thought that
ent ought to receive the encour-
the club. A number of the best
in the city were interested in the
and the aim of the chauffeurs
er themselves and improve their
their employers. Mr. Gash, of
a, said that the National Asso-
Automobile Manufacturers had
dering the chauffeur question for some time and had appointed a committee, of which he was a member. This committee had sent a circular to all the automobile manufacturers belonging to the association, requesting their opinion as to how the question could best be dealt with, and there had been a practical unanimity of opinion that the N. A. A. M. should issue licenses to competent chauffeurs. Mr. Gash seemed to think that it would be more appropriate for a national organization to issue chauffeurs' licenses than for a local club.

American Chauffeurs' Club.

On March 18 about 100 chauffeurs and repair men held a meeting at the garage of the Mobile Company, New York, and took initiative steps toward forming a club for social and professional purposes. A temporary organization was effected by the election of Joseph Kane as president and Louis H. Warren as secretary. A committee composed of Edward E. Hawley, chairman; Samuel Brock, Van Allen Soule, Fred Rankin and Mr. Van Haren was appointed to report a constitution and bylaws at the next meeting, which was scheduled for last night. Among the avowed objects will be the regulation of trade abuses, the elimination of dishonest chauffeurs and the adoption of a system of grading for members. At the meeting four grades, according to ability, experience, etc., to be determined by practical demonstrations and examinations, were suggested, but a representative of THE HORSELESS AGE has since been informed that this system is not considered feasible, and two grades, first class and second class, will be suggested as a substitute. The idea of unionism is disavowed as impracticable, and there seems to be a difference of opinion as to the advisability of organizing under other auspices, as has been suggested, although it is considered desirable by some that the rules governing examinations, etc., should be made by an independent body. It is said that the A. C. A. and the N. A. A. M., both of which have the subject under consideration, may be approached for their sanction and assistance, but a strong desire to remain absolutely independent is manifest.

The Proposed State Association.

The following letter has been sent to all automobile clubs in New York State by the committee recently appointed by the Syracuse A. C.:

"A committee has lately been appointed by the Automobile Club of Syracuse to communicate with all similar organizations throughout the State concerning the proposition to organize a State automobile association, which may eventually become a member of a national association of the same character.

"It is not the purpose of the proposed organization to antagonize in any way the National Association as it now exists, or any other existing automobile club or organization, but to knit them together in a common interest.

"The primary purpose of the State association will be to secure legislation to improve the highways of the State and also concerning other matters of interest to automobilists. It is believed that a State association comprising all or practically all the automobile clubs of New York State could wield a much more potent influence upon members of the State Legislature than could scattered clubs, working individually and without a uniform purpose. Having a common purpose, clearly defined, it will be possible for every club throughout the State to bring to bear upon their respective members of the Legislature an influence that will secure recognition.

"We write to inquire whether your club cannot be sufficiently interested in this project to arrange for the sending of a delegation to a convention which shall be called to meet in Syracuse, as the most central point, at some time in the future, for the purpose of forming a State association whose object shall be as above indicated.

"If you will personally lay this matter before the members of your club at its next meeting, and make an effort to have a delegation sent to the convention referred to, we shall feel deeply obliged, and believe it will be for the real benefit of your club not only, but of automobilists generally.

"We shall also appreciate it very much if you will forward to us the names of others interested in automobiling whom you are inclined to think might be interested in the matter."

United States Exports of Automobiles.

The annual report of the Treasury Department for the year ending June 30, 1902, gives the value of the exports of American made automobiles for that period as $948,528. Of the total valuation given, all except $92,714 worth of machines were shipped from New York. The largest foreign buyer was the United Kingdom, whose purchases amounted to $671,553. Second on the list was France, which took $59,051 worth. The purchases of Manitoba, Ontario and Quebec aggregated in value $31,111; those of Mexico, $27,710; Germany, $24,491; the Philippine Islands, $14,216; Austria, $13,106; British South Africa, $12,637; Cuba, $11,152; Argentina, $10,203; Denmark, $9,905; British Australasia, $9,581; Japan, $9,513; Belgium, $7,797; Chinese Empire, $6,645; Netherlands, $5,285; British Columbia, $4,828; British East Indies, $4,299; Peru, $3,000; Italy, $2,200; Brazil, $2,150; Norway and Sweden, $1,697; Bermuda, $1,500, and Hong Kong, $1,175.

The Electric Contract Company, New York, are about to remove from 53 Maiden lane to 202 Centre street. The company have taken the sales agency for the spark coils of E. Q. Williams, Syracuse.

NEW VEHICLES AND PARTS.

The Argyll Gasoline Car.

The Hozier Engineering Company, of Bridgeton, Glasgow, the manufacturers of the cars to be described, are among the largest British manufacturers of automobiles. The cars they build are of medium weight and of comparatively high "ability," high speed French motors being used in conjunction with a special transmission gear of the company's own design, which gives direct drive on the high gear.

The car of which a half tone is shown herewith is fitted with a two cylinder 10 horse power Clement engine of 3.4 inches bore and 4.4 inches stroke, and with a change gear giving three forward speeds of 8, 16 and 25 miles per hour respectively, at 1,100 revolutions per minute of the engine.

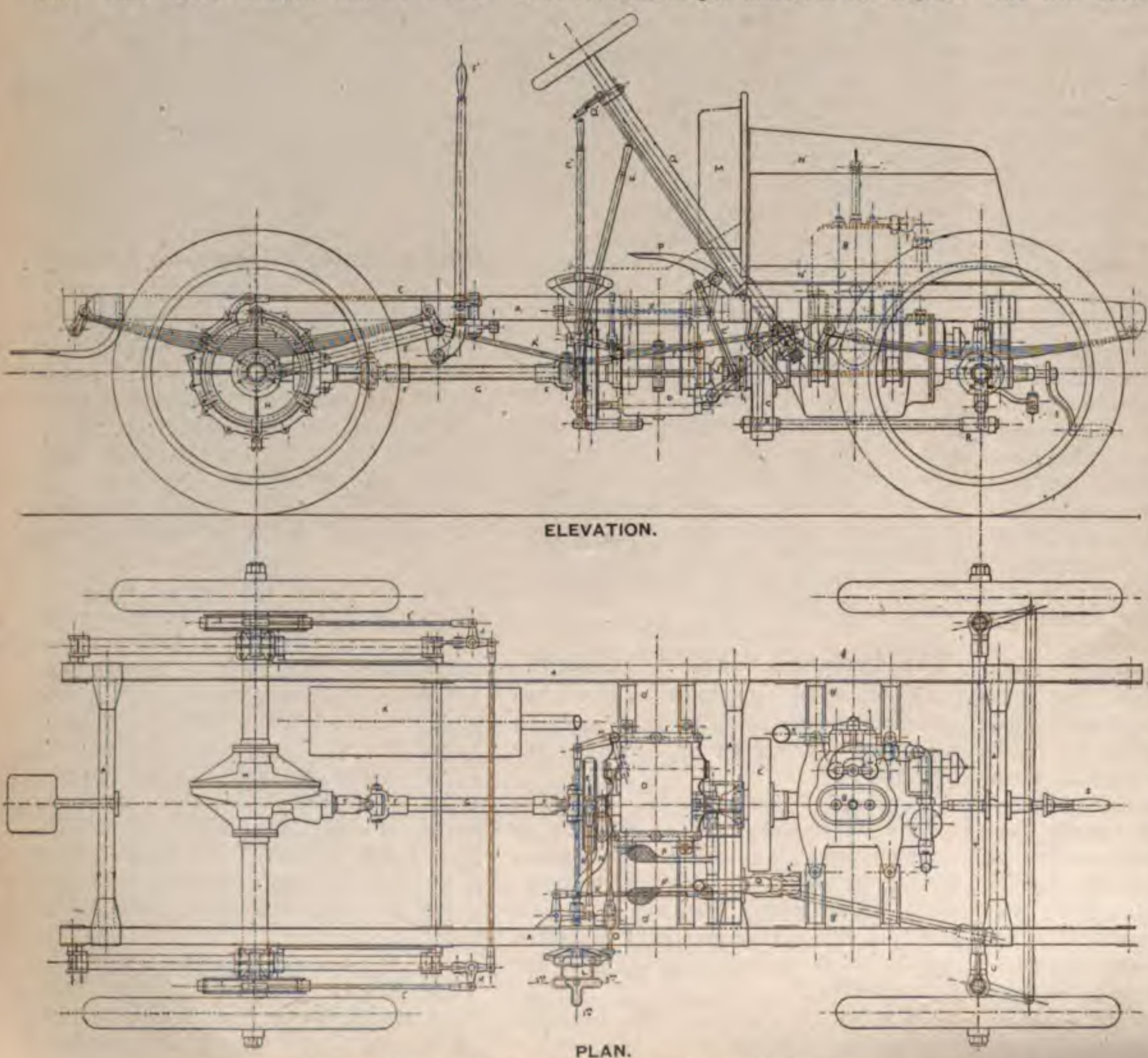
Fig. 1.—The Argyll 10 Horse Power Tonneau.

The wheel base is 76 inches and tread 53 inches. The wheels are wood, artillery type, 30 inches in diameter, fitted with 3¼ inch Clipper Continental tires. The weight of the car complete with tonneau body is about 1,400 pounds.

Figs. 2 and 3 represent an elevation and plan of the chassis respectively. The frame A is made of seasoned ash, armored with a sheet steel plate running the whole length. It is reinforced by the fitting of a truss rod A^1 shown in the elevation. The frame brackets which carry the springs, brakes, &c., are made from sheet steel, which secures extreme lightness with great strength. The engine B is fixed to the carriers B^1, which are bolted direct to main frame. The friction clutch is contained in the flywheel C, and is actuated by the pedals P and P^1. When the pedal P^1 is depressed the brake E is also applied. The flexible joint which transmits the power from the friction clutch to the gear box is shown at J^1 (elevation). The gear box D is fixed to the carriers D^1 which are bolted to the main frame; and the lid of the gear box is held down by clamps shown at I^1, enabling the lid to be taken off by unscrewing two nuts. The power is transmitted from the gear box to the live back axle H through the universally jointed shaft G, the universal joints being marked F. The shaft which carries the bevel driving wheel and enters the gear box H at F is squared, and the joint F can slide on the square shaft when the back axle moves about the radius rods S^1 (elevation).

The Clement engine with which this car is fitted was fully described in our issue of March 19, 1902.

Fig. 4 shows the friction clutch. A is the engine shaft with the flange D, which carries the flywheel E keyed to it and forced up on the taper by means of the nut B. The nut B is extended to form the bearing for the central portion of the clutch G. This design is claimed to prevent the clutch getting out of alignment, and if the leather face is kept in proper condition no trouble will be experienced from a slipping clutch. The conical ring F is held in the flywheel by the bolts shown, and by their removal the clutch can be withdrawn. The spring L holds the



Figs. 2 and 3.—Elevation and Plan of Chassis.

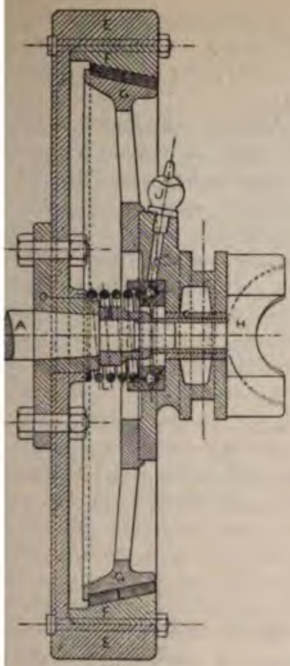


Fig. 4.

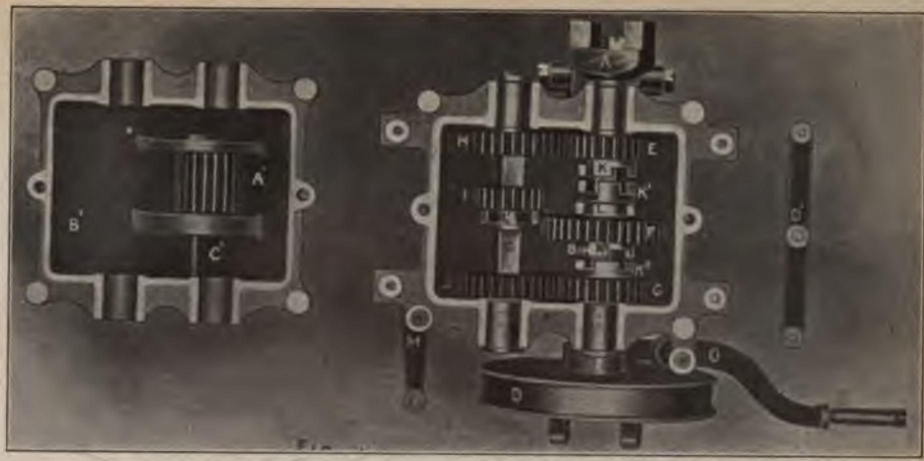


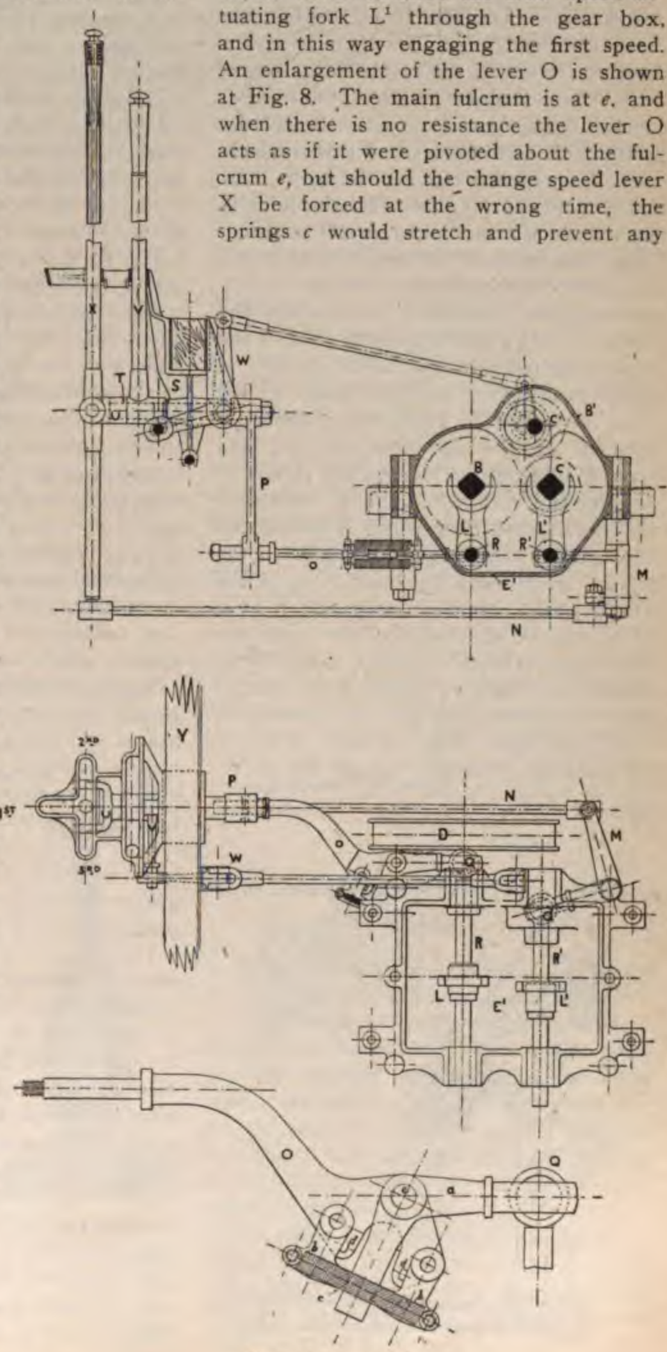
Fig. 5.

ngaged, and it is obvious there no end thrust when the car ıg, as the flanges that the spring ;ainst revolve together. Owing all bearing K the clutch quick- s to revolve when the operat- l is depressed. This greatly fa- the changing of the gear. J is cator for the clutch bearing C and ing K. The power is transmitted clutch to the gear box by means liding universal joint H. This vents any strain in the bearings igine or gear box when driving ven roads.

is transmitted from the engine the friction clutch to the fork A, firmly fixed to the hollow shaft ı the pinion E is cut from the he power is then transmitted to eller shaft by means of the shaft is turned down at one end to ıe hollow shaft. The direct top ive is obtained by sliding the which is mounted on the square ıe shaft B until the clutch K^1 en- th the clutch K. The shaft B be rotated at the same speed as ı E, and the pinions H, J and G dle. It will be observed that the ' will revolve at a slower speed clutch K according to the ratio ›inions E H and J G, so that piece F is moved until the ' engages with K^2 then the sec- l is obtained. To secure the first pinion F is put back in the mid and the pinion I is moved on e countershaft C until it engages pinion F. The pinion A^1 is eccentrically in the lid of the and is broad enough to engage slow speed pinions I F when ıot in mesh. In this way the re- obtained. The various move- explained by referring to line drawings. The sliding pinions F and I are operated by levers O and M respectively.

Figs. 6, 7 and 8, line drawings, show the action of the change speed lever. The quadrant is shown at S (Fig. 6), and the change speed lever is marked X. When the lever X is in the central position, midway between the first, second and third speeds (see Fig. 7), the gear box is in the free position. When the change speed lever X is moved backward and forward between the second and third speeds, then there is no motion given to the slow speed actuating bell crank M, and when the hand lever X is pushed into the first speed position in the quadrant, then there is no motion given to the second and third speeds operating lever O, so that the second and third speed actuating fork L would remain in the free position when the first speed is engaged. Second and third speeds are operated through the locking shaft T, the lever P, the lever O, the sliding joint Q, and the shaft R, to which is fixed the actuating fork L, which is pulled backward and forward in the gear box when the hand lever X is operated in the second and third speeds.

The first speed is operated through the connecting rod N, the bell crank M, and the sliding joint Q^1, which pulls the shaft R^1, to which is fixed the slow speed actuating fork L^1 through the gear box, and in this way engaging the first speed. An enlargement of the lever O is shown at Fig. 8. The main fulcrum is at *e*, and when there is no resistance the lever O acts as if it were pivoted about the fulcrum *e*, but should the change speed lever X be forced at the wrong time, the springs *c* would stretch and prevent any



Figs. 6, 7 and 8.

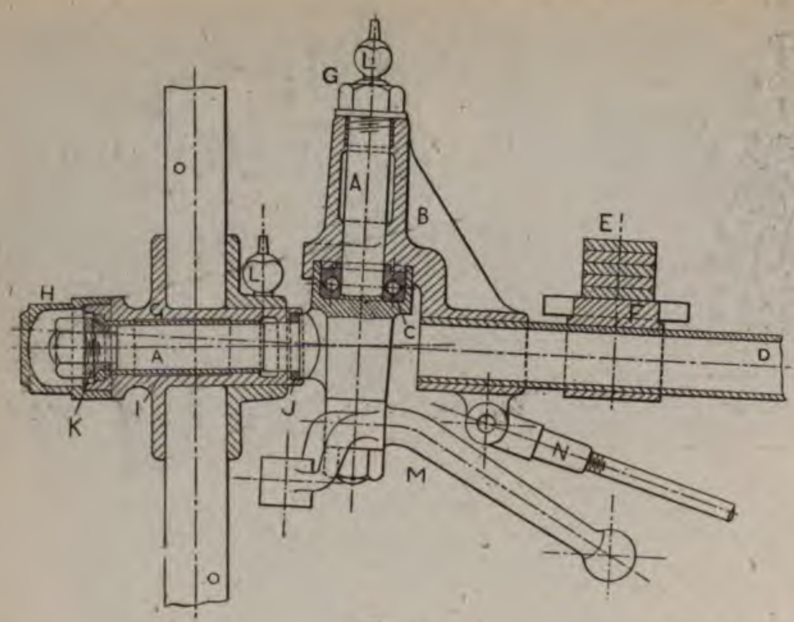


FIG. 9.

damage being done to the clutches of the gearing. It will be observed that the little levers *b* are pulled against the stops *d* by means of the springs *c* so that the joint Q will always return to its normal position. This improvement removes almost all danger of breaking gears.

A separate hand lever V operates the reverse through the bell crank W and the connecting rod which is fixed to the end of the small lever which is fixed to the eccentric stud C[1]. The reverse pinion is mounted on the eccentric stud C[1], and when the operating lever V is pulled to the opposite end of the slot in the quadrant the reverse gear wheel is introduced between the slow speed pinions when the forward gear operating lever X is in the central position of the quadrant.

The points claimed for the gear are that when driving at night there is no chance of missing the gears, as the change gear lever is in each direction pushed to a full stop, there being no slots to find in the quadrant; it is also impossible to accidentally put in the reverse gear in the dark, as it is operated by a separate lever; owing to the levers O being made flexible it is impossible to smash the clutches or strain the gear.

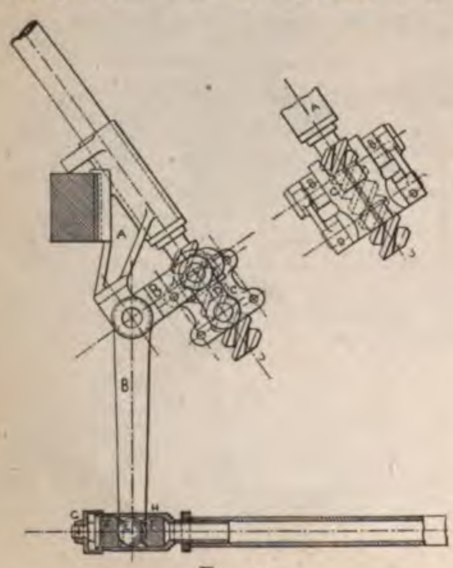


FIG. 10.

The drive to the rear axles is by bevel gears, the differential gear being located at the centre of the axle. The case of the differential gear is made of steel stampings, and the bevel gear crown is made in the same manner. The driving bevel gears are cut out of steel and hardened and the bevel wheel is secured to the differential gear by four bolts. The rear axle runs on roller bearings mounted on a hardened steel sleeve fixed to the axle and running in hardened steel bushes. The differential and driving gear are inclosed in an aluminum casing in two parts; this case contains the end thrust ball bearings against which the steel plates on the outside of the differential gear bear. The rear axle is surrounded by axle sleeves bolted to the aluminum gear case and having fastened to them at their outer end the brackets for the body springs. Oil retaining washers are fitted over the outside of the sleeves at the outer roller bearings, and the whole axle runs in grease which is introduced through plug openings in the axle sleeves.

The front axle D (Fig. 9) is made from seamless tubing and is provided with a truss N below it. The wheel hubs G are made from cast steel and are fitted with hardened steel bushes I. The hub spindles A are made from steel stampings, also hardened, so that the bearings are practically unwearable. A conical washer K takes the end thrust, and the inside of the bearing is fitted with a leather washer, rendering it dust tight. The hub spindles are supported in the guides B and the load rests on the ball bearings C. The steering bell crank is shown at M. A ball and socket joint is used, which is adjustable, and wear can be taken up. H is the outside cap. The lubricators are marked L. E is section of the front spring, the spring bracket F being fixed to the axle.

The steering tube bracket (Fig. 10) is firmly bolted to the main frame of the car, and carries the bell crank B. The method for preventing any backlash from getting on the steering wheel is best understood by referring to the front view of screw and nut. There are flat sides milled on the screw nut C, which fit between the jaws of the bell at B B. When the steering wheel is operated the nut slides between bell crank jaws B B, and this motion is given to the steering bell crank by means of the connecting links D D. The steering connecting rod I is provided with ball bearings which can be adjusted to take up wear with the adjusting nut G. The screw nut C is made in two halves, and they can be let together to tighten the nut on the screw when worn.

The car is fitted with rear hub brakes. The operating mechanism is compensated by means of a bell crank arrangement illustrated in THE HORSELESS AGE of February 11 last.

The Desberon Fourteen Horse Power Motor.

At the shops of the Desberon Motor Car Company, Fifty-first street and Twelfth avenue, New York, a number of four cylinder gasoline engines are being constructed after the designs of F. C. Stinzing, the company's superintendent.

The engine is of the vertical type and has flanged, air cooled cylinders and water cooled heads. All the cylinders and heads are cast individually. The crank case is an aluminoid casting and is provided with arms that rest on the false frame of the vehicle. The bolts that hold down the cylinder heads extend into the crank case, so that only four bolts per cylinder are required. The upper part of the cylinders is finished and fits into the heads for a distance of about 1½ inches. A gasket is not required to pack the joint between a cylinder and its head; however, a gasket of thin sheet copper is furnished with each cylinder. The bore of the cylinders and the stroke of the pistons are 3¼ and 3½ inches, respectively. At 1,200 revolutions per minute it is claimed that the engine will develop 14 horse power at the brake. By controlling the mixture and spark the speed of the motor may be varied between 300 and 1,400 revolutions per minute.

The exhaust valves are operated mechanically in the usual manner, and the inlet valves are of either the automatic or actuated type. To operate them by mechanical means a second cam shaft is provided, which is located over a foot above the shaft on which the exhaust cams are mounted. Ignition is by jump spark alone, or by both jump and contact spark. In the latter case a fitting is screwed into the cylinder heads, which is provided with recesses

s. The mechanism of the make
levice is actuated by a cam on
am shaft.
ost four cylinder engines, par-
ose of French design, the Des-
quite a large flywheel. Its di-
16 inches and the face has a
½ inches. The average thick-
rim is about three-quarters of
t is bored out to receive the
er of the conical clutch to an
degrees. The crank shaft is a
g and is provided with a flange
he flywheel is bolted. All the
hree in number) are of bronze
Lubrication of the crank shaft
ocating parts is by the splash
he company purposes to build
arger units in the future, viz., a
r of 12 horse power and a four
24 horse power.

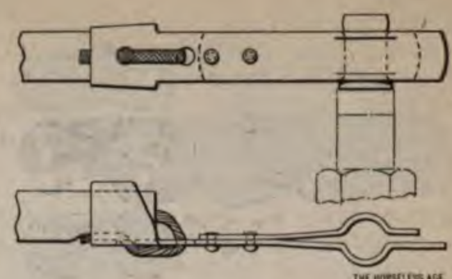
oley Cycloidal Engine.

o the plant of the Cooley Cy-
gine Company in Allston, Bos-
revealed much that was novel
ing. The large plant is equipped
s a machine shop fitted with
ls, but as a laboratory for the
g of the Cooley motor. The
artment is equipped with all
laboratory apparatus, such as
for determining the qual-
m, scales for measuring con-
er, thermometers and gauges,
ing for particular testing pur-
dynamos carefully studied as to
, which are used to furnish the
e motors under test.
notors of from 10 to 30 horse
seen in operation, one of them
ected directly to the armature
multipolar generator and an-
tly connected to a screw pro-
ating in a large tank of water.
which was connected to the
pplied a bank of lamps which
nt's calculation furnished an ap-
indication of the amount of en-
delivered. The Cooley motor
y rotary in its action is almost
e from vibration, and it is re-
ompact in form and very light.
rd motor comprises only two
ts, the piston and a shell of pe-
, both of which rotate within
ry portion of the machine. The
ocity of the rotating piston is
e-half times that of the rotating
these ratios, together with the
m of the piston and the other
mber, secure the several acts of
expansion, compression and re-
a reciprocating engine. All
ored into the stationary casting,
re no valves about the engine
ception of a three way valve, by
ngine is reversed, and the throt-
The term "cycloidal" refers to
the cross section of the piston
er rotating member which are cycloidal in character in order to secure the proper relations between the moving parts.

The packing rings used to secure tightness of operation between the piston and the other moving portion and between this portion and the stationary part of the engine are of most ingenious construction. Roller bearings of a peculiar construction are used entirely in these engines, which render their operation nearly independent of lubrication. It is claimed that full advantage is secured of the expansion of steam in the Cooley motor—an achievement which has not been realized in ordinary rotary engines—and it is further claimed that, by the nature of the design, steam pressure is active through three-quarters of each revolution, so that no balance wheel is required, as the heavy piston acts somewhat in this capacity. An interesting feature concerning this motor is that its speed is very moderate when running at an economical point, and thus no gearing down is necessary, as is the case in the use of steam turbines. At present the motors are governed by a simple centrifugal throttling governor, but it is intended to make use of a governor which shall act upon the point of cut off. The cycloidal design of motor is equally applicable to be used in the reverse sense, that is, as an air compressor or as a pump, and both these pieces of apparatus were shown in operation, the pump being intended for a feed water pump for steam carriages or for a circulating pump. Several Cooley motors were seen applied to steam carriages. In one of these the motor was hung upon the rear axle and entirely encased with metal, and in another the Cooley motor supplanted the engine in its usual position in the body. It is claimed that these motors operate perfectly noiselessly and without vibration and with economy comparable with good simple engine practice.

The Kenosha Automobile Jack.

The auto jack herewith illustrated, which is manufactured by the Kenosha Jack Manufacturing Company, Kenosha, Wis., is a jack with a rack and pinion movement, the pinion being actuated by a worm, to which the operating handle, a box wrench with cross handle, is applied. The jack can be instantly raised to its limit of height by simply pulling up the rack. This throws the worm out of gear until the rack is dropped, when it falls into gear by its own weight. The jack has a capacity of 1½ tons and is suitable for raising wheels of from 26 to 34 inches diameter. The height of the bar when down is 12 inches and when up 18 inches. The device is constructed of malleable iron and automatically locks itself in any position.



Tracy's Connector.

An Improved Connector for Spark Plugs.

The accompanying drawing illustrates an improved connector devised and placed upon the market by Joseph Tracy, of 513 Seventh avenue, New York. The advantages of this connector are that the connection can be made by simply slipping the connector in place, and that there is no danger of breaking the wires at the joint with the connector as with many forms of connectors.

When used in conection with a De Dion spark plug a small brass plug is secured to the top of the spark plug by means of a machine screw, as shown. The brass plug has a cylindrical central portion and a ridge or enlarged portion at each end. The connector proper consists of two strips of sheet brass riveted together and pressed to form a collar or sleeve near their outer ends, to fit around the brass plug referred to. One of the strips is made of spring brass and the other of soft brass, in order that they may be bent together again if they should have become separated. It will be noticed that the stranded conductor of the cable is not soldered to the connector. The larger one of the two brass strips is clamped around the rubber insulation of the cable and the bared end of the conductor is passed through a drill hole in the strip and clamped between the strip and the rubber. All the strain when the conductor is bent comes therefore on the rubber, which is very elastic, and the annoying breaking of the connection is thus avoided.

New Detachable "Whitney" Roller Chains.

A new roller chain has been brought out by the Whitney Manufacturing Company, of Hartford, and is illustrated in the cut herewith, in which A is a spring steel locking plate and B the regular side plate. The regular side plates cannot turn on the rivets, on account of the irregular shape of the holes, and the spring steel locking plates absolutely prevent the regular side plates from coming off.

The chain is detachable at any point, as shown by cut. It is claimed that it can be taken apart quickly and without the least difficulty when it is necessary to repair the chain or to shorten same.

The inventors further claim for the new

WHITNEY ROLLER CHAIN.

detachable chain all advantages found in the solid link riveted chains and other types of detachable chains, without any of their disadvantages.

The Boston Show

The show held at Boston last week under the auspices of the Boston Automobile Dealers' Association proved a considerable success. A large number of American machines were represented, as well as some foreign ones. The floor space of Symphony Hall was utilized to the utmost advantage, and the machines were arranged with much care. The coloring of the stands and their trimmings were similar and the signs were restricted to a uniform height. On the whole the exhibition was of very pleasing appearance. Among the new vehicles exhibited were the Crompton gasoline and Eclipse steam car, of which illustrations are shown herewith.

THE ECLIPSE STEAM CARRIAGE.

The steam car manufactured by the Eclipse Automobile Company, of Boston, Mass., embodies some novel features, principal among which is the use of a kerosene burner instead of one consuming gasoline. The burner used is made by the Barber Manufacturing Company, of Boston, and with it, it is claimed, the process of steaming up from cold water can be accomplished in about ten minutes. The burner is composed of a large number of pipes radiating from a central gas chamber, each of which pipes is filled with fine transverse slots through which the gas passes. The general form of the burner is similar to those in present use. The kerosene passes from the tank through a long spiral coil which is enclosed in a pipe which receives live steam from the boiler, so that the kerosene is given a preliminary heating up to boiler temperature. The kerosene then passes into the gasefying coil, which is curved about the central portion of the burner in the midst of the most intense flame, and thence is returned to the spraying nozzle. This heating coil encloses a wire rope which not only furnishes a large heating surface to the kerosene vapor passing through it, but receives the deposit of carbon which seems to be inevitable in the use of kerosene. The wire rope may be removed and cleaned of the deposit when necessary. Before passing into the spraying nozzle the fuel passes through a filtering screen, which removes all foreign substances and prevents the obstruction of the jet. The pilot light is started into action by means of heating with alcohol, and very soon after the pilot light is in full operation the oil is sufficiently heated to produce gasification and enable the main burner to be started. It is claimed that the Eclipse carriage can be operated about a quarter further on a gallon of kerosene than it can be upon the same quantity of gasoline.

This car differs very little in appearance from the accepted type of light steam carriage. The wheels are of 28 and 30 inches diameter in the front and rear respectively and of the suspension type. The wheel base is 62 inches and the tread standard. The weight of the vehicle empty is 1,150 pounds, and with supplies 1,300 pounds. The capacity of the gasoline tank is 14 gallons and that of the water tank 35 gallons. The bearings are of the roller type in the rear and ball in front. The running gear is of ordinary tubular construction, with double elliptic springs throughout. The motive power is carried upon an angle iron frame and consists of a Mason engine and a water tube boiler of the company's own design. This boiler is constructed of a central water space with pipes connecting its upper and lower portions, and so placed as to present a very large surface to the hot gases. After passing the engine the steam enters a combined feed water heater and muffler, which is stated to raise the feed water to 180° Fahr. From the muffler the steam escapes to the stack.

Evidently one of the objects borne in mind in designing the vehicle was to secure easy and convenient control of the motive power. The steering is by means of a lever, which operates a steering column that rises close to the seat directly between the two occupants, so that either one may steer with equal convenience. Directly behind the steering column are located the throttle and the bypass control. At the right of the operator is the lever of the auxiliary hand pump, which is of especially large and convenient design. In the footboard in front of the operator are the reverse pedal and the brake, as well as the cylinder oil pump. The needle valve controlling the supply of fuel to the main burner is also within easy reach. The regulation of the fire is by the usual form of diaphragm, but the piping of the carriage in general has apparently been simplified over that found in many vehicles of the same class. The bonnet furnishes ample room for tools and supplies, and ventilated doors in the side of the body give easy access to the mechanism. Continuous mud guards give a very neat appearance to the car.

ECLIPSE RUNABOUT.

The Crompton Motor Works, of Worcester, Mass., exhibit a steam car of elegant and substantial appearance and excellent finish, which embodies some features differing radically from ordinary steam practice. The boiler equipment is decidedly novel, and consists of twenty-four sections, or rather of twenty-four distinct fire tube boilers, twelve of which are arranged upon each side of the rear portion of the body. Each of these small boilers, which all deliver steam into a common pipe and are fed from a common water supply, consists of steel shells 3 inches in diameter and carries 17 copper flues. Each boiler is heated from a ring burner, and twelve of these burners are embodied in a single burner plate, one of which is directly under each of the two batteries of boilers. Each burner plate is supplied from a single gen-

and has intercommunicating pas- or relighting any particular burner ly other one. The gasoline supply rolled in the usual manner by an tic diaphragm.

engine is horizontal and of the four r single acting type, with valves d by a secondary bevel gear shaft. ocated 'head end" forward in the n the rear portion of the body be- he two batteries of boilers, and is ed from above by a plate which is l to an appropriate frame. The haft is nearly over the rear axle and er is transmitted by means of bevel o a vertical shaft, which contains a ic joint that admits of relative mo- tween axle and engine. This shaft a bevel gear at its lower extremity meshes with the gear in the differ- The four cylinders of the engine above the other, and by unscrew- plate which supports the motor it lifted out, the vertical shaft sep- at the telescope joint. The gearing rotected from dust.

water level in the boiler is automat- maintained in a positive manner dependence upon float mechan- d no gauge glass is provided upon icle shown.

water pump is of the direct acting ype, and an auxiliary hand pump is pplied. The water tank—of 47 gal- pacity—is located under the seat, gasoline supply of 10 gallons is in two tanks on the dash, one of the usual supply and the other an y.

running gear is of structural steel, ll elliptic springs, front and rear. nt wheels are 34 inches in diameter rear 36 inches. Ball bearings are front and roller bearings in the rear hich is tubular in construction, with rcing arch. The wheel base is 6 nches. Steering is by means of in- wheel and worm gear.

how was favored with fine weather he closing day and the attendance ceptionally good. It is reported organizers cleared a profit of $6,- the reports of business done were y satisfactory, some of the dealers g to have sold out their entire

were a number of social functions ection with the Show, among which inner given by Harry Fosdick, the Winton agent, to visiting and local er men and friends at the Auburn- n on Wednesday. Thursday was l day, invitations to attend the aving been extended to all the actors esses playing at the various Boston During the week many members Legislature visited the Show, and on y evening General and Mrs. ere present. On Friday night the Dealers' Association gave its first inner at the Hotel Lenox, at which lers' counsel, ex-Judge Dewey, made some remarks on legislation, while F. E. Stanley compared auto and horse travel.

After the closing of the Show Symphony Hall presented a very animated scene, as everything had to be out of the building by midnight. Everybody seemed anxious to assist the visiting exhibitors to get their exhibits started for Washington, where they will be on show this week, and the vacation of the hall proceeded most rapidly.

The Washington Show

The third annual automobile show of the Washington Retail Dealer's Association opened at 8 p. m. Monday in the Washington Light Infantry Armory, Fifteenth street N. W. and F street. The weather, which had been unfavorable, cleared and the attendance was therefore fully up to expectations. The following is a list of the exhibitors:

U. S. Long Distance Auto Co.; Cook & Owesney—Winton, Stevens-Duryea, General; National Capitol Auto Co.—Peerless, Packard, Autocar, Oldsmobile; Howard M. Gill—Stanley steamer; American Cycle Manufacturing Co.—Waverley, Toledo, Cadillac, Elmore; A. L. Cline—Rambler, Locomobile, Conrad; Washington Electric Vehicle Transportation Co.—Columbias; Washington Motor Car Co. —Knox, Northern Orient; Northwestern Military Academy—Steam wagon, bike not arrived; Walker & Hazelton—Fisk tires; Schaunn Auto and Motor Mfg. Co.—Spark plug, engine; *The Automobile;* The Horseless Age; National Electric and Supply Co.—Parts and supplies; Automobile Storage and Supply Co.—Parts and supplies; Pittsburg Reduction—Aluminum castings and tonneau body; Twentieth Century Mfg. Co.—Lamps; Rose Mfg. Co.—Lamps; A. M. Kessler—Diamond tires, lamps and bells; Howard A. Rhine—Merkel motor bike; National Motor Car Co.—E. R. Thomas line; Charles E. Miller & Brother—Grout, Clément cycle motor.

The space afforded was scarcely sufficient to accommodate an exhibition of this character, but from present indications results from a business point of view will be satisfactory, inasmuch as interest in automobiles is rapidly on the increase in Washington.

Colonel Pope, who was expected to make an address on good roads, did not put in an appearance.

A. C. A. Matters.

"The Rhine, and Student Life at Heidelberg," was the subject of a lecture by Prof. Henry Zick at last night's meeting.

Crompton Runabout.

The attention of members has been called by Secretary Butler to the reckless speeding of their automobiles on the Hudson County Boulevard in New Jersey, with the request that it be stopped in the interest of automobiles in that State.

A. A. A. Affairs.

The racing committee has given its sanction for the Daytona-Ormond, Fla., automobile meet on March 26, 27 and 28.

The Kankakee (Ill.) Automobile Club has been admitted to membership. The club has about fifteen members.

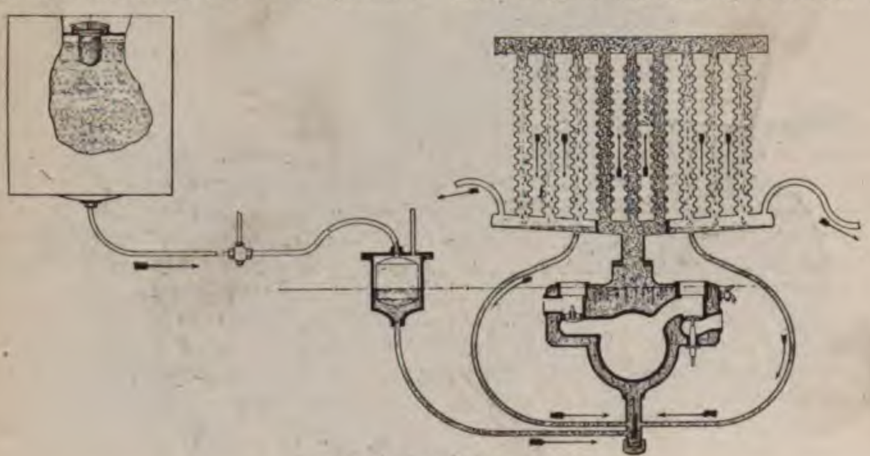
In connection with the Paris-Madrid race negotiations are on foot with the Compagnie des Wagons Lits for a train to follow along the course. This will probably be arranged in connection with the Sud Express, and tickets are likely to be fixed at a price of 230 francs ($46).

...OUR... FOREIGN EXCHANGES

The Gillet-Forest Engine Cooling System.

The Gillet-Forest gasoline vehicle is one of the few modern French cars employing a horizontal motor. It also differs from the majority of modern foreign machines in that it employs thermo-siphon circulation. The circulation system embodies some novel features and is represented in the drawing herewith.

The engine is located on the forward part of the frame and a radiator of corrugated tubes surrounds the bonnet. The water tank is placed under the seat of the vehicle. The water is maintained in the cylinder jacket at a constant level by means of a float, and only steam enters the radiator. When the engine is started the jacket is full of water, and as the engine heats and the water rises in temperature steam is formed and rises from the top of the jacket through the central radiator tubes, here shown as three in number, and returns through the outside tubes on both sides. During the passage through these tubes the steam is condensed and collects in the lower headers, to which the outside tubes are connected. These headers are slightly inclined, and from their lower point pipe connections lead to the bottom of the jacket. At the outer ends of the lower headers are connected pipes for the escape of uncondensed steam. As the water is evaporated and the level in the jacket sinks the float permits some of the water from the tank to pass into the jacket, and thus maintain a constant level. There is no advantage in keeping the cooling water in the jacket at a lower temperature than the boiling point, as no lubricating difficulties are experienced. There is, in reality, a direct gain in economy, as less heat is lost through the cylinder walls the higher the temperature of these walls.



GILLET-FOREST COOLING SYSTEM.

Antwerp is organizing a system for doing the whole of the street scavenging and refuse removal with automobiles.

Legislative Discussion Before the Automobile Club of Great Britain and Ireland.

The promised general discussion of the proposals of the Automobile Club's legislative committee took place March 6 at the clubhouse, the president, Roger Wallace, K. C., in the chair. Briefly, the suggested bill proposed to provide, in return for a removal of the legal limit of speed, a method of identification by names or numbers, safeguards being secured against any misuse of the powers which these distinguishing marks would put in the hands of enemies of motor cars. Earl Russell was the principal spokesman of the strong opposition, urging that it would not be possible to get proper safeguards against the abuse of the powers of identification, while the black sheep who disgraced automobilism by furious driving would find means of obscuring their number or name plates. Mr. Jarrott observed that it would do great harm to the industry at a moment when it was making strenuous efforts to secure a premier position. A strong feeling was manifest in the meeting in favor of letting matters rest as they are, seeing that the public prejudice against motor cars is dying away, and the speed limit would cease to be insisted on; whereas once motorists had consented to numbering they would never get it abolished. The Hon. John Scott Montagu, M. P., on behalf of the bill, pointed out that it did not prescribe large numbers, but left the manner of the identification to be decided by the authorities. Staplee Firth stated that the local government board has not the power of requiring numbers if it wishes. Mr. Montagu observed that that evening the Premier had said to him that the Government would not find time to introduce legislation for motor cars this session; and the chance of a private member getting a bill through was very remote. But they ought to be prepared with a bill, and much as they all disliked numbering, he had the assurance of Walter Long and others that there was no chance of securing any mitigation of the speed limit unless it were coupled with a means of identification.

The meeting was not a representative one, as only 81 out of 2,300 members were present. Finally, the following resolution was carried: "That this meeting declares itself to be opposed to any proposal for affixing to a car any name or number which is conspicuous when in motion, and requests that a vote of the whole membership be taken by post."

Contest of Searchlights.

A contest of automobile searchlights (phares) is being organized by the "Automobile Club Touraine" (of Tours, France), to take place April 17 to 19, beginning at 8 p. m. On the 19th there will be an obligatory exposition of the apparatus taking part in the contest, at the park in which are kept the vehicles participating in an endurance contest held at the same time. No charge will be made for space.

The manufacturers who wish to enter for this contest are required to furnish two lamps of the kind they wish to have tried. The contestants must be on hand at 8 p. m. on April 17, at a place to be designated, and fill and light their lamps under the eyes of the jury, which will thus have an opportunity of forming an opinion about the facility of filling and lighting. One of the lamps will be submitted to a timekeeper to determine the time it will burn without refilling. The second lamp will be submitted to trials to determine its illuminating power. The latter, after burning for two hours, will be extinguished and kept under lock until the following evening, when it will be relighted under the supervision of the jury, without being recharged, and submitted to the same tests as the previous evening. The jury will also determine the facility of cleaning the first lamp which has been kept burning the first night until the fuel was exhausted. The jury will base their awards on the following factors: First cost of lamp; cost of burning per hour; time of burning with one charge; illuminating power; facility of filling, lighting and cleaning; compactness and weight. Three regular and two special prizes will be awarded, the highest prize being a gold medal and 20 per cent. of the entry fees. The entry fee per set of lamps is $5.

Efficiency of Binding Agents for the Active Material of Accumulators.

In the *Centralblatt für Accumulatoren, Elementen und Accumobilenkunde* of March 1 E. Leimer describes some experiments with various binding agents for accumulator pastes. Ten different materials were tried, as follows: Pure water; pure sulphuric acid solution of 1.17 specific gravity; pure sulphuric acid solution of 1.20 specific gravity mixed with pure English glycerine; alcoholic extract of shoemaker's pitch; amber (rosin ?) dissolved in turpentine and sulphuretted hydrogen;

aqueous solution of phenol; salicylic acid; spirit of wine; pyridine. Ten equal quantities of lead oxide were taken and a paste formed with each of the above "binding agents." These pastes were formed into cakes and had a lead frame cast around them, and were then subjected to the forming process. The plates were suspended in baths of equal density and after they had been in these baths for some time the density of all baths was again equalized. All the plates were subjected to exactly the same treatment and weight and electrical measurements were made at every turn, and the results are of great interest to storage battery specialists. The amount of active material shed by the plates during the charging process was least for the plates using pure sulphuric acid solution mixed with glycerine and salicylic acid respectively.

The automobile exhibition which is to follow the Paris-Madrid race will be held at the Fine Arts Palace in Madrid.

The Automobile Club of Holland has just held its annual meeting. The club, which has now a membership of 154, is organizing a reliability trial for August next.

Amended regulations have just been prepared by the Local Government Board of Ireland, and will come into force on March 31, by which the speed limit for motor cars will be raised from 12 to 14 miles an hour.

An international cup, to be raced for annually by motor boats, has been presented to the Automobile Club of Great Britain and Ireland. This cup will be known as the Alfred Harmsworth International Cup. The marine motor sub-committee of the club are formulating the conditions in connection with the first race, but are not at present prepared to make a more definite announcement.

The Scottish Automobile Club has arranged to hold a non-stop trial from Glasgow to London on May 13 and 14 next. The object is to show that these towns are within two days' car run of each other, with a reasonable time allowed for rest. The route is not announced, but the distance will be roughly 400 miles. A compulsory stop will be made at Leeds, and for all other stops, except for traffic, marks will be deducted. No advantage will be gained by a speed in excess of the legal limit, while in towns and villages 8 miles an hour is the maximum permitted.

At the recent Brussels show there were 150 exhibits, ranging from the truck of 20 or 40 horse power to the voiturette of 6 or 8 horse power. One solidly constructed truck, which was immediately bought for the Congo Free State, had a carrying capacity of 6 tons and hauling capacity of 6 additional tons; average speed per hour, 12 kilometres (7.45 miles). The consumption, either alcohol or gasoline, was 1 litre (1.05 quarts) for 3 kilometres (1.86 miles), and its capacity permitted a run of over 90 miles without refilling.

The firm of Krupp, in Essen, Germany, is said to be about to engage in the manufacture of Serpollet steam cars. Some months ago it was reported that the German Serpollet patents had been acquired by the Daimler Company.

The Automobile Club of South Africa celebrated its first anniversary last month, when a distinguished gathering of members and guests supported A. T. Hennessy, the vice president. Rudyard Kipling during the evening responded to the toast of the parent club, the A. C. G. B. and I.

The business of the Darracq Company, including the works at Suresnes, has been sold to an English syndicate, a limited company, among the large shareholders of which is Mr. Avery, of Birmingham. The management of the French end of the concern will remain for some years in the hands of the present staff and under the direction of M. Darracq himself.

Of the cars to run in the Paris-Madrid race a foreign contemporary writes: The Mercedes are said to have a motor of 90 horse power and six cylinders; the Mors, a motor exceeding 100 horse power and with Jenatzy's magnetic clutch; the De Dietrich, only a 40 horse power motor, but the whole rearranged, reducing the air resistance to a minimum. Panhard and Levassor are said to have retained their Paris-Vienna type.

A French machinist has introduced a new idea with regard to the upkeep of motor cars which is worth recording. For a monthly charge of $25 he undertakes to visit his clients once a week to keep their cars *au point*, this work to include the grinding of the valves, adjusting the ignition, overhauling the carburetor and the water circulation, adjusting the chains, bearings and change gear, attending to the lubrication of the various parts, etc., but not the washing of the car. Special charges are of course made for any repairs or new parts that may be necessary.

The program for the Nice Automobile Week has now definitely been fixed as follows: March 27 and 28, arrival of caravanne organized by *l'Auto* and competition of heavy automobiles; March 28, competition of brakes; March 29, flower carnival; March 30 and 31, competition of large and small touring cars; April 1, La Turbie hill climbing test; April 2, competition of appearance at Monte Carlo; April 3, 1 kilometre hill climbing test at La Turbie; April 4, oil can consumption trials; April 5, record kilometre and mile races for the H. de Rothschild Cup; April 6, exhibition.

LEGISLATIVE AND LEGAL.

The Scovel Automobile Law.

This bill was finally passed by the New Jersey Senate on March 19, and at this writing is awaiting the signature of Governor Murphy. Mr. W. E. Scarritt, who worked incessantly for its passage, believes that the Governor will sign the bill, and pronounces it "both from the standpoint of road protection and from the viewpoint of the automobilist a modern as well as scholarly scheme of automobile legislation." Following is the text of the bill in full:

An act defining motor vehicles and providing for the registration of the same and uniform rules regulating the use and speed thereof.

1. Wherever the term "motor vehicle" is used in this act it shall be construed to include automobiles, locomobiles and all other vehicles propelled otherwise than by muscular power, excepting the cars of electric and steam railways and other motor vehicles running only upon rails or tracks; but nothing in this act contained shall be construed to apply to or affect bicycles, tricycles or such other vehicles as are propelled exclusively by muscular pedal power.

2. Every resident of this State who is the owner of a motor vehicle, and every non-resident owner whose motor vehicle shall be driven into this State, shall file in the office of the Secretary of State a declaration duly verified that such owner is competent to drive the motor vehicle for which application for license is made, and a written statement containing the name and address of such owner, together with a brief description of the character of such motor vehicle, including the name of the maker and the manufacturer's number of the motor vehicle, if number there be, and the rated horse power of the motor vehicle, and shall pay to the Secretary of State a registration fee of $1 for each motor vehicle; the Secretary of State shall issue for each motor vehicle so registered a certificate, properly numbered, stating that such motor vehicle is registered in accordance with this section, and shall cause the name of such owner, with his address, the number of his certificate, and a description of such motor vehicle or motor vehicles, to be entered in alphabetical order of the owners' names in a book to be kept for such purpose; this section shall not apply to manufacturers or dealers in this State of motor vehicles except as to vehicles kept by such manufacturer or such dealer for private use or for hire.

3. The owner of each and every motor vehicle driving the same upon the public

streets, public roads, turnpikes, parks, public parkways, public driveways or other public highways in this State shall have the number of the license issued as aforesaid by the Secretary of State upon the back of every such motor vehicle, in a conspicuous place, so as to be plainly visible at all times during daylight, such numbers to be separate Arabic numerals, not less than 3 inches in height, the strokes to be of a width not less than three-eighths of an inch, and, excepting the numbers upon the lamps, as required by Section 4 of this act, such owner shall not be required to place any other marks of identity upon said motor vehicle.

4. Every motor vehicle shall carry, during the period from one hour after sunset to one hour before sunrise, at least two lighted lamps, showing white lights, visible at least 200 feet in the direction toward which such motor vehicle is proceeding, and shall also exhibit at least one red light visible in the reverse direction; upon the sides or fronts of the two aforesaid lamps showing white lights shall be displayed, in such manner as to be plainly visible when said lamps are lighted, the number of the license issued as aforesaid by the Secretary of State, the same to be in separate Arabic numerals, not less than 1 inch in height; every motor vehicle shall also be provided with good and efficient brake or brakes, and shall also be provided with suitable bell, horn or other signal device.

5. The following rates of speed may be maintained, but shall not be exceeded, upon any public street, public road, or turnpike, public park or parkway, or public driveway, or public highway in this State by anyone driving a motor vehicle:

(1) A speed of 1 mile in six minutes upon the sharp curves of a street or highway and at the intersection of prominent cross roads where such street, road or highway passes through the open country, meaning thereby portions of a town, township, borough or village where houses are more than 100 feet apart.

(2) A speed of 1 mile in seven minutes where such street or highway passes through the built up portion of a city, town, township, borough or village where the houses are and average less than 100 feet apart.

(3) Elsewhere and except as othe wise provided in subdivisions 1 and 2 of this section a speed of 1 mile in 3 minutes.

Provided, however, that nothing in this section contained shall permit any person to drive a motor vehicle at any speed greater than is reasonable, having regard to the traffic and use of highways, or so as to endanger the life or limb or to injure the property of any person; and it is further provided that nothing in this section contained shall affect the right of any person injured either in his person or property by the negligent operation of a motor vehicle to sue and recover damages as heretofore.

6. Every person driving a motor vehicle shall, at request or upon signal by putting up the hand or otherwise from a person riding or driving a horse or horses in the opposite direction, cause the motor vehicle to stop and remain stationary so long as may be necessary to allow said horse or horses to pass.

7. No owner of a motor vehicle who shall have obtained a certificate from the Secretary of State as hereinbefore provided shall be required to obtain any other license or permit to use or operate the same, nor shall such owner be excluded or prohibited from or limited in the free use thereof, nor limited as to speed upon any public street, avenue, road, turnpike, driveway, parkway, or other public place, at any time, when the same is or may hereafter be opened for the use of persons having or using other pleasure carriages, nor be required to comply with other provisions or conditions as to the use of said motor vehicle, except as in this act provided; provided, however, that nothing in this section contained shall be construed to apply to or include any speedway created and maintained in pursuance of an act of the Legislature of the State of New Jersey, entitled "An act to provide for the construction and maintenance of speedways in the counties of this State," approved March 19, 1902; nor to any parks or parkways created and maintained in accordance with an act of the Legislature of the State of New Jersey, entitled "An act to establish public parks in counties of this State and to provide for the acquirement, improvement and regulation of the same," approved March 20, 1901.

No city, town, township, borough or other municipality shall have power to make any ordinance, by-law or resolution limiting or restricting the use or speed of motor vehicles, and no ordinance, by-law or resolution heretofore or hereafter made by any city, town, township, borough or other municipal or local authority by whatever name known or designated in respect to or limiting the use or speed of motor vehicles shall have any force, effect or validity.

8. Any person driving a motor vehicle the owner of which shall not have complied with the provisions of this act, and which motor vehicle shall display a fictitious number, the same being a number other than that designated for such motor vehicle by the Secretary of State, shall, upon conviction, be fined in a sum not exceeding $100, and, in default of payment thereof, be punished by imprisonment in the county jail for a period not exceeding thirty days; provided, this section shall not be construed to prohibit a motor vehicle displaying the proper number of its license from also displaying any other number for any lawful purpose.

9. Any person driving a motor vehicle upon any public streets, public highways, public roads, turnpikes, parks, public parkways or public driveways in this State in a race or on a bet or wager shall, upon conviction, be fined in a sum not exceeding $50, and, in default of payment thereof, be punished by imprisonment in the county jail for a period not exceeding twenty days.

10. Upon oath or affirmation made according to law that any person has violated any of the provisions of this act, any magistrate of the county where such offense is committed may, within three months after the commission of such offense, issue process in the nature of a summons or warrant, in his discretion, at the suit of any person, to the use of the overseer of the poor of the city, town, township or borough where such offense is committed, against the person so charged, which process shall, when in the nature of a warrant, be returnable forthwith, and when in the nature of a summons, in not less than three nor more than ten days; such process shall state what section or provision of this act is alleged to have been violated by the defendant, and the time and place of such violation, and on the return of such process, or at any time to which the trial may be adjourned, the magistrate before whom said complaint shall be made shall proceed to hear the testimony and to determine and give judgment in the matter without the filing of any pleading; if the magistrate before whom such trial is had shall find the defendant guilty, he shall give judgment for the penalty mentioned in the section or provision herein violated, and such costs as are allowed in the justice's court in like proceedings for collection of penalties; in default of the payment of the judgment and costs, the defendant so convicted may be sentenced to the county jail for such period as is provided for in this act.

11. Any constable or police officer is hereby authorized to arrest, without warrant, any person driving a motor vehicle contrary to the ninth section of this act, and to bring the person so offending before any magistrate of the county where such offense is committed; the person so offending shall be detained in the office of such magistrate until the officer making such arrest shall make oath or affirmation, which he shall do forthwith, as provided in Section 10 of this act, whereupon such magistrate shall issue a warrant returnable forthwith; the said magistrate shall proceed to hear and determine said complaint and give judgment or adjourn the hearing of said complaint, as provided by Sections 10 and 12 of this act.

12. The magistrate before whom a complaint is made shall adjourn the hearing of said complaint for a time not less than three days and not exceeding ten days, if the defendant shall so request, and shall deposit the sum of $50 as security to appear at the date to which such hearing may be adjourned; and if the said defendant does not appear at the time mentioned, then the said sum deposited shall be forfeited, and the balance thereof, after the payment of the costs, shall be paid to the

[overs]eer of the poor for the use of the poor [of th]e city, town, township or borough [wher]e the offense is committed.

[15.] If a person violating any of the pro[visio]ns of this act shall be or reside in any [othe]r county of this State than that in [whic]h said warrant shall be issued, the [magi]strate issuing the same shall, in writ[ing], thereupon direct that the sum of $50 [be d]eposited as security by any party so [charg]ed, and it shall be the duty of the [officer] serving the same to carry it to some [magi]strate of the county wherein such per[son r]esides or can be found; the magistrate [to w]hom the same shall be presented, on [proo]f being made to him of the handwrit[ing o]f the magistrate who issued such war[rant,] shall indorse his name thereon with [a]uthority to arrest such person in the [coun]ty where the magistrate so indorsing [resid]es, which shall be sufficient authority [to e]xecute such warrant in the county [wher]e it shall be indorsed.

[16.] The party so charged being appre[hend]ed shall be taken before the magistrate [who] indorsed said warrant, or some other [magi]strate of the same county, who may, if tendered, shall take from such per[son] a deposit of $50 in cash to secure the [appe]arance for trial of said defendant be[fore] the magistrate who issued said war[rant,] and thereupon the person so appre[hend]ed shall be released from the custody [of th]e officer arresting him; the date of [the] trial shall be fixed by the magistrate [acce]pting said deposit, and the sum so re[ceive]d by him shall be turned over to the [magi]strate issuing the warrant, to be re[taine]d and disposed of as provided in Sec[tion] 12 of this act in default of the appear[ance] of the person so charged.

Any party to any proceeding insti[tuted] under this act may appeal from the [judg]ment or sentence of the magistrate to [the C]ourt of Common Pleas of the county [in w]hich the said proceedings shall take [place]; provided, that the party appealing [shall], within fifteen days after the date of [the s]aid judgment, file a written notice of [appe]al, pay the costs of such proceedings [and d]eliver to the magistrate a bond to the [over]seer of the poor of the city, ward, [town], township or borough in double the [amou]nt of the judgment and costs, with at [least] one sufficient surety, conditioned to [pros]ecute the said appeal and to stand to [and] abide by such order or judgment as [may] thereafter be made against said party; [com]mitment, however, may issue at any [time] before the taking of an appeal for the [impr]isonment of the defendant unless se[curit]y be given as provided in Section 18 [of th]is act, which said commitment shall [be va]cated either by appeal or by the pay[ment] of the judgment and costs.

Whenever an appeal shall be taken [as a]foresaid, it shall be the duty of the [magi]strate to send all papers and money, if [any] deposited, pursuant to the provisions [of th]is act, together with a transcript of [the p]roceedings in the case, to the next [Cour]t of Common Pleas of said county, which court shall try and determine all such appeals in the same way and manner that appeals from the courts for the trial of small causes are now tried and determined.

17. Any person violating the provisions of this act shall, except as otherwise provided herein, upon conviction, be fined in a sum not exceeding the amounts hereinafter set forth: For a violation of Section 2, $50; for a violation of Section 3, $15; for a violation of Section 4, $10; for a violation of Section 5, subdivision 1, $25; for a violation of Section 5, subdivision 2, $25; for a violation of Section 5, subdivision 3, $50; for a violation of Section 6, $10; in default in the payment of any such fine there shall be imposed an imprisonment in the county jail for a period not exceeding ten days; provided, that any offender who shall have been found guilty of a violation of this act and sentenced therefor, and who shall be convicted of a second offense of the same violation, may for such second offense be fined in double the amount herein prescribed for the first offense, and may, in default of the payment thereof, be punished by imprisonment in the county jail for a period not exceeding ten days; and further provided, that any offender who shall have been found guilty of a violation of Section 5, subdivision 3, thereof and sentenced therefor, and who shall be convicted of a second violation of the same section and subdivision, may, in the discretion of the magistrate, instead of being fined as prescribed, be punished by imprisonment in the county jail for a period not exceeding ten days.

18. Every fine shall be payable forthwith, or, in default of such payment, the magistrate may accept a bond to the overseer of the poor of the township, borough, ward or city in double the amount of the judgment and costs, with at least one sufficient surety, conditioned to pay the said judgment within a period thereafter to be fixed by said magistrate, not exceeding ten days, or in lieu of such bond the magistrate may retain possession and hold the motor vehicle as security for such payment.

19. All penalties collected from persons offending against the provisions of this act shall be paid by the magistrate receiving the same to the overseer of the poor of the city, ward, town, township or borough where the offense is committed, for the use of the poor in their respective districts.

20. The word "magistrate" used in this act shall be deemed and understood to mean and include all justices of the peace, judges of city criminal courts, police justices, recorders, mayors, and all other officers having the power of a committing magistrate.

P. George Gow, a capitalist, of San Raphael, Cal., who was arrested at the instance of Rev. A. Crosby on a charge of violating the automobile ordinance, will test the validity of the ordinance in the courts.

Bailey Automobile Bill.

This bill was introduced in the New York Senate on March 11. The practically complete text which follows shows the amendments agreed upon at conferences between Albert R. Shattuck, representing the Automobile Club of America, and Townsend Scudder, counsel for the Long Island Highway Protective Association, and Judge Church. Matter in quotation marks is new; that in brackets is old and is to be omitted. The bill has been favorably reported by the committee:

Section 163. Entitled to Free Use of Highways.—The commissioners, trustees or other authorities having charge or control of any highway, public street, [park], parkway, driveway or place, shall have no power or authority to pass, enforce or maintain any ordinance, rule or regulation by which any person using a bicycle or tricycle, an automobile or motor vehicle, whether the same be propelled by steam, gasoline, electricity or other source of energy, shall be excluded or prohibited from the free use of any highway, public street, avenue, roadway, driveway, park, parkway or place, at any time when the same is open to the free use of persons having and using other pleasure carriages, except upon such driveway, speedway or road as has been or may be expressly set apart by law for the exclusive use of horses and light carriages. The board of supervisors of any county may adopt ordinances, "not inconsistent herewith," regulating the speed of automobiles or motor vehicles on the county roads, highway or streets of such county, outside the limits of cities. "No ordinance, rule or regulation adopted by the authorities of any city, in pursuance of this section, or of any other law, shall require an automobile or motor vehicle to travel at a slower rate than 8 miles per hour within the closely built up portions of such city, nor at a slower rate of speed than 15 miles per hour where the houses in such city upon any highway are more than 100 feet apart. No ordinance, rule or regulation adopted by the authorities of any municipality, in pursuance of this section, or of any other law, shall require an automobile or motor vehicle to travel at a slower rate of speed than 20 miles per hour within any town or village outside of the territory within which the speed is restricted by the latter part of this section." An ordinance adopted by a board of supervisors in pursuance of this section, regulating the rate of speed of automobiles or motor vehicles on the highways or streets of such county outside of cities, shall supersede any such ordinance in such county adopted by the authorities of a town or village. But nothing herein shall prevent the passage, enforcement or maintenance of any regulation, ordinance or rule regulating the use of bicycles or tricycles in highways, public streets, driveways, parkways and places, or the regulation of the speed of carriages, vehicles, engines, automobiles or other motor vehicles in public parks and

upon parkways and driveways in the city of New York, under the exclusive jurisdiction and control of the department of parks of said city, nor prevent any such commissioners, trustees or other authorities in any other city from regulating the speed of any vehicles herein described in such manner as to limit and determine the proper rate of speed with which such vehicles may be propelled, nor in such manner as to require, direct or prohibit the use of bells, lamps and other appurtenances, nor to prohibit the use of any vehicles upon that part of the highway, street or parkway, commonly known as the footpath or sidewalk. "No automobile or motor vehicle propelled by steam, gasoline, electricity or other source of energy shall pass a person driving a horse or horses, or other domestic animal, or foot passengers walking in the roadway of the highway, or cross an intersecting main highway, at a greater rate of speed than 8 miles per hour, nor pass a public school, on the days when school is held, between the hours of 8 o'clock a. m. and 4 o'clock p. m., or pass a building of public worship on the Sabbath day during the usual hours of service at a greater rate of speed than 10 miles per hour, or cross a dam or causeway where the traveled portion of the roadbed is less than 20 feet wide at a greater rate of speed than 4 miles per hour. No automobile or motor vehicle propelled by steam, gasoline, electricity or other source of energy shall run upon any highway of this State within a distance of one-half mile of any post office of this State at a greater rate of speed than 8 miles per hour, if the local authorities having control of the highway or highways within such distance indicate by an appropriate sign on the side of any highway upon which speed is to be regulated that speed is to be reduced to the rate of 8 miles per hour. Upon such sign there shall appear clearly the words 'Slow down to 8 miles,' and also an arrow pointing in the direction where the speed is to be reduced, provided, however, that if the territory beyond the said limit of one-half mile of any post office is built up to such an extent that in the judgment of the authorities having control of such highway or highways speed should be reduced beyond such half mile limit of the post office that then, in such case, the authorities having charge of such highway or highways may erect such sign posts at a greater distance than one-half mile of such post office and at the limits of such built up portion of the highway, and thereupon no such automobile shall run within such distance thus established at a rate of speed in excess of 8 miles per hour. Nothing herein contained shall be construed as preventing a board of supervisers from setting aside for a given time a road for speed tests to be conducted under proper restrictions for the public safety."

Sec. 2. Section 166 of Chapter 568 of the laws of 1890 is hereby amended to read as follows:

Sec. 166. Registration by Owners of Automobiles.—Every owner of an automobile or motor vehicle shall, within thirty days after the amendment to this section takes effect, file in the office of the Secretary of State a statement "containing" [of] his name and address, with a brief description of the character of such vehicle, "including the name of the maker and the number of the motor vehicle," and shall pay to the Secretary of State a registration fee of $1, "for each motor vehicle." The Secretary of State shall issue to such person a certificate, "properly numbered," stating that such owner is [he has] registered in accordance with this section, and shall cause the names of such [persons] "owner, with his address, the number of his certificate and a description of such motor vehicle," to be entered in alphabetical order in a book kept for such purpose. Every person hereafter acquiring an automobile or motor vehicle shall, within ten days after acquiring the same, register with the Secretary of State as required by this section. This section shall not apply to a person manufacturing or dealing in automobiles or motor vehicles, except those for his own private use, "and except those hired out. The Secretary of State shall number the certificates which he has heretofore issued in the order in which they have been issued, and upon request of the holder of any such certificate shall, without further fee, stamp thereon the number of the same or issue a duplicate showing such number. Every person desiring to operate an automobile as mechanic, employee or for hire shall, within thirty days after the amendment to this section takes effect, file in the office of the Secretary of State a statement giving his name and address, and also a description of the character of the machine which he is enabled to operate, and shall pay to the Secretary of State a registration fee of $1. The Secretary of State shall issue to such person an operator's certificate, properly numbered, stating that such person is registered in accordance with this section, and shall cause the name of such person, with the number of his certificate, to be entered in alphabetical order in a book kept for such purpose. Every person acquiring such a certificate shall at all times, when operating an automobile, carry such certificate with him."

Sec. 3. Section 169 of Chapter 568 of the laws of 1890 is hereby amended to read as follows:

Sec. 169. Stop Automobile on Signal.—Every person driving an automobile or motor vehicle shall at request or signal, by putting up the hand, from a person driving or riding a restive horse or horses, or driving domestic animals, cause the automobile to immediately stop and to remain stationary, "and upon request shall cause the engine of such automobile to cease running" so long as may be necessary to allow said horses or domestic animals to pass. This provision shall apply to automobiles going either in the same or in an opposite direction.

Sec. 4. Section 169a of Chapter 568 of the laws of 1890 is hereby amended to read as follows:

Sec. 169a. License or Permits for Automobiles.—Any person owning or operating an automobile or motor vehicle, whether the motive power of the same be electricity, steam, gasoline or other source of energy, except such as are used for public hacks, trucks or other vehicles for hire, shall not be required to obtain any license or permit pursuant to the provisions of any local or municipal resolution or ordinance, or the rules or regulations of any commissioners, trustees, supervisors or other authorities having charge or control of any highway, public street, parkway, driveway or place, or pursuant to the provisions of any municipal charter or any other statute, except as herein contained. Every such automobile or motor vehicle shall have "the number of the certificate [license] issued under Section 166 by the Secretary of State" placed upon the back thereof in a conspicuous place "so as to be plainly visible, the numbers to be Arabic numerals, black on white ground, each not less than 3 inches in height and each stroke to be of a width not less than half an inch. A person who shall operate or run any automobile or [other] motor vehicle upon any highway, public street, park, parkway, driveway or place, without a certificate [license] first had and obtained as herein provided, or being the holder of such a certificate [license] shall refuse to exhibit the same on demand to any peace officer, shall be deemed guilty of a misdemeanor, and upon conviction thereof shall be punishable as provided in Section 169b, and any person who shall violate any of the provisions of this statute, or of any speed ordinance adopted pursuant hereto, upon conviction thereof shall, in addition to the penalties provided in Section 169b, be further punished [able] for a first offense by a suspension of his right to run an automobile [license] for a period of not less than two weeks, for a second offense by a suspension of his said right [license] for a period [not less than] of one month, and for a third offense by a revocation of his said right [license]. A person convicted four times of violating a speed ordinance or ordinances shall thereafter be disqualified and barred from receiving a license certificate."

Sec. 5. Section 169b of Chapter 568 of the laws of 1890 is hereby amended to read as follows:

Sec. 169b. Penalty.—"The violation of" [penalty for violating] any of the provisions of Section 163 or Sections 166 to 169a inclusive, "or for violating any ordinance, rule or regulation adopted by the authorities of any municipality, or the commissioners, trustees or other authorities of any parkway or driveway," relating to automobiles or motor vehicles, propelled by electricity, steam, gasoline or other source of energy, [shall be not exceeding $25], "shall be deemed a misdemeanor punishable by a fine not exceeding $50 for the first offense.

ishable by a fine not less than $50 eding $100 or imprisonment not thirty days or both for a second nd punishable by imprisonment, prisonment not exceeding thirty by fine not less than $100 nor ex- $250 for a third or subsequent

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Kansas Automobile Law.

(Text of Senate Bill No. 223, introduced by Senator Morehouse.)

utomobile shall be provided with bell, horn or other signal, and pped with good and efficient Every automobile shall exhibit e period from one hour after sun- hour before sunrise one or more owing white lights visible within ble distance in the direction to- ich the automobile is proceed- e lamp or lamps shall be so to be free from obstruction to n other parts of said automobile vehicle.

son in charge of an automobile treet or public highway in this l operate the same at any speed e greater than is reasonable and aving due regard to the traffic f the highway, or so as to en- e life or limb of any person.

mobile shall be run on any pub- y outside the limits of the thick- or business part of any city or a speed exceeding twenty (20) hour, and within the thickly set- siness part of any city or town d exceeding ten (10) miles an

erson having charge of a motor all, whenever approaching any awn by a horse or horses, op- motor vehicle in such manner cise every reasonable precaution t the frightening of any such l to insure the safety of any per- or driving the same; and if such pear restive or frightened, the control of such motor vehicle ce the speed thereof, turn to the acticable, and give the road, and, d by signal or otherwise by the such horses, shall proceed no vard such animal or animals, but tionary so long as may be nec- allow such horses to pass. This shall apply to automobiles or icles going either in the same or posite direction.

pproaching a crossing or inter- ays, and also in traversing the r intersection, the person in con- y automobile shall run at a rate less than that above specified, greater than is reasonable and ving regard to the traffic and the intersecting ways.

es of the first, second and third his State shall have power by local ordinance to regulate and control the use and speed of automobiles and motor vehicles within the limits of said cities and prescribe penalties for the violation thereof, such ordinances not to be inconsistent or repugnant with the provisions of this act Any person failing to comply with the requirements of this act or violating any of its provisions shall be guilty of a misdemeanor, and upon conviction in a court of competent jurisdiction shall be punished by a fine not exceeding $100.

Chicago aldermen claim that there is ample authority for adopting an ordinance requiring numbers to be placed on automobiles. This is in opposition to the opinion of the Automobile Club's counsel that such an ordinance would not be constitutional.

R. B. Easley, a stockholder in the Universal Automobile Company, of San Francisco, Cal., who was refused access to the books, has caused the arrest of the secretary and also of the manager, W. J. Woosley, upon the charge of misrepresentation and swindling him out of a considerable sum of money.

The Knoxville (Tenn.) ordinance has been amended to make the speed limit 10 miles instead of 8 miles an hour within the city limits, and to require automobilists to ring their bells 50 feet before reaching crossings. The ordinance also provides for a fine of not less than $10 nor more than $50 for violations. It is understood that the ordinance has been signed by the mayor.

E. B. Haines, Paterson, N. J., has brought suit for $1,000 against the United States Long Distance Automobile Company, Jersey City. The basis of the suit is the purchase in August, 1902, of one of the company's touring cars, which Mr. Haines claims is barely a 7 horse power machine, and not 10 horse power, as he claims was represented by the company's manager, and which he says is defective both in workmanship and material.

The hearing on the New York city ordinance in relation to the rules of the road, which was set down for last Friday, was again postponed at the request of Capt. A. R. Piper, Second Deputy Police Commissioner, whose special duty is to look after the enforcement of city ordinances, and who has just returned from an investigation of the traffic question in London. Captain Piper's request was strongly advocated by President Cantor, of the Borough of Manhattan, and others, and at the suggestion of A. R. Shattuck he was given a week to submit his ideas in writing, although Alderman Oatman, who framed the measure and a member of the committee, protested against further delay.

After many hearings the Committee on Public Health and Safety of the Connecticut Legislature has reported two speed bills as substitutes for the Warren measure, and it is said they are likely to pass. One provides that each owner of a motor vehicle must file with the State Secretary a full description of his machine and obtain a number, which shall be painted conspicuously on the machine, with the initial of the State in characters 3 inches high. The cost of registering shall be $1. Persons from outside the State must comply with the laws of their States and have displayed the initial letters of their States. They need not register. The other limits the speed to 15 miles an hour outside city limits and to 12 miles inside city limits. Vehicles must slow down and signal at all street corners and crossings and when approaching horses, and if the horses are frightened the automobiles must stop. The penalty under the first bill is from $5 to $25 fine, and under the second $200 or thirty days in prison, or both.

The Cincinnati (Ohio) ordinance to license and regulate the use of automobiles was on March 16 adopted by the board of legislation.

Rev. Arthur Crosby, San Raphael, Cal., has published a pamphlet in which he asks the supervisors of Marion County to grant a petition, which is being circulated, excluding automobiles from the county under heavy penalties.

A good roads convention for the purpose of organizing a good roads league was held at St. Augustine, Fla., on March 17. The object will be to provide means for constructing a hard surface driveway along the entire east coast of the State.

A bill appropriating $1,000 in the interests of good roads in each county in the State has been introduced in the Minnesota Legislature. The county is to bear one-third of the cost, the township in which the road is located one-third, and the State the other third.

The automobile owners wanted the committee to enact an ordinance so that the regulation would be uniform in every municipality throughout the State, but the committee takes the ground that that duty devolves upon the municipality and the Legislature ought not to interfere.

The Wisconsin Assembly Judiciary Committee have reported a substitute for the Moldenhauer bill, providing for the licensing and regulating of automobiles and motor vehicles. It is much like the original bill, except that it makes the owners liable for damages for injury caused to person or property by their unskillful, negligent or careless handling. It provides that all owners of automobiles shall register their names and descriptions of their machines in the Secretary of State's office and pay a fee therefor of $1. Each machine is required to be equipped with efficient brakes and provided with a suitable bell, horn or other signal, and if used at night shall carry lamps, showing white lights in front and red lights in the rear. Cities and villages are given authority to enact ordinances imposing further regulations. Violation of the act is made a misdemeanor punishable by a fine of from $1 to $25.

MINOR MENTION

The Atlantic City (N. J.) Ice Company will introduce automobile ice wagons.

George B. Adams has become the New York agent of the International Motor Car Company.

The Winchendon (Mass.) Automobile Club has been organized with a charter membership of nine.

The Auto Vehicle Company, of Los Angeles, Cal., are building a double opposed cylinder, two cycle engine for automobiles.

The Halsey Automobile Company, St. Louis, Mo., on March 16 took possession of their new building at 3914-3918 Olive street.

Peter Cooper Hewitt, of New York, is reported to be about to enter the market with an 800 pound automobile with aluminum body.

Capt. C. E. Garner has been elected president of the Florida Automobile Association, Jacksonville, in place of W. W. Cummer, resigned.

The Rushmore Dynamo Works, makers of the Lens Mirror headlight for automobiles, etc., are about to move from Jersey City to Plainfield, N. J.

Gibson Howard, Buffalo, N. Y., will open a repair station at 281 Chicago street on April 1 and a storage station at 69 and 71 Cary street on April 15.

A 70 horse power racing machine is being built from designs of N. W. Schlater for H. R. Morse by the Sidney B. Bowman Automobile Company, New York.

Arrangements have been made by the Los Angeles (Cal.) Cycle Board of Trade to give a two days' meet for automobiles and motor cycles about the fiesta time.

W. H. Kirkpatrick, formerly with the American Dunlop Tire Company, has taken charge of the sales department of the Peerless Motor Car Company, Cleveland, Ohio.

It is reported that E. E. Wade, of the Colorado Springs (Col.) Automobile Company, has closed contracts to handle the Winter, Baker, General and Rambler machines.

It is reported on good authority that several builders of steam trucks in the United States are forming a combination, headed by the Morgan Motor Works, of Worcester, Mass.

J. C. Wettergreen, of Hyde Park, Mass., has brought out an anti-sooting device in which the spark terminals are placed in a glass tube mounted on a hard fibre base. The terminals are machine screws and the gap can be adjusted.

We are informed that R. A. Alger, Jr., of Detroit, Mich., collided with a street car while traveling in his new Packard Model F at a high rate of speed. The front of the car was cracked in several places, but no adjustments of the machinery were necessary, and Mr. Alger drove the car to his barn under its own power.

The proposition to locate an automobile factory in Geneva, N. Y., reported to have been made by Charles E. Turner, New York, is now said to be definitely settled and that a company is to be incorporated with a capital of $500,000.

The Standard Motor Vehicle Company have purchased from Homer N. Motsinger, of Pendleton, Ind., his patent for a multi-cylinder horizontal motor, which, together with other patents they own, gives them, they claim, the control of this type of engine.

The Arenberg cup, which was won by De Knyff last year during the Paris-Vienna race, will be competed for again during the Paris-Madrid race, but only two entries have been made for it yet, by the firms of Gobron-Brillie and Brouhot respectively.

The tour and meet committee of the Cleveland (Ohio) Automobile Club, composed of Charles B. Shanks, chairman, Walter C. Baker and Windsor T. White, is planning a long tour to Canada for the coming season. There will also be many short trips and at least one race meet.

On April 1 A. G. Southworth will open a repository and salesroom at 10 Clinton street, Brooklyn, N. Y., which will be under the management of A. W. Blanchard. He will continue his garage at 342 Flatbush avenue and will handle the Waverley, Rambler, Toledo and General automobiles, for which he has the exclusive Brooklyn agencies.

The Rockliffe trolley repair wagon which was entered in the 100 mile contest of the Long Island Automobile Club last year, has been accepted by the Brooklyn Rapid Transit Company. The vehicle was remodeled and fitted with a 12 horse power Ball gasoline engine (twin cylinders, 5x6 inches) and a Ball transmission gear by the New York Gear Works, Brooklyn, N. Y.

A chemical fire extinguisher for automobiles has been placed upon the market by the H. W. Johns-Manville Company, of New York. The extinguishing agent is a chemical compound which is contained in a metal tube 22 inches long, 2 inches in diameter, weighing 3 pounds. It is hung on a hook or nail by means of a ring strongly fastened in the cover of the tube.

W. M. Letts, agent for England and Ireland of the Cummings Tire Manufacturing Company, of New York, has equipped the cars of J. W. Thompson, Yokohama, Japan, and of A. L. Reber, and many other Panhard machines, with the Cummings tire protectors. In this country this protector has been ordered by H. S. Harkness, Brooklyn, N. Y., and other automobilists in New York, Baltimore, Cleveland, Hoboken, etc.

The builders of a 2 ton steam truck, which has been in the service of an express company in New York city for about a year, inform us that during November, December, January and February $61.25 worth of fuel was consumed, which includes both coal and kindling wood. The former ranged between $6.50 and $9 a ton and the latter was purchased at $16 a cord. The average daily run was 15 miles, the consumption of fuel being at the rate of 120 pounds of coal per day. The total mileage to date is about 2,500. When backing up the odometer deducts from the amount of ground covered, instead of adding to the previous total mileage.

Dudley Marks has designed a new automobile coat, which has the frock so constructed that when the wearer is seated the front forms a lap robe, and when it is used for walking it has the appearance of an ordinary walking coat.

New Incorporations.

Peoria Motor Coach Company, to run a line of motor cars between Peoria and East Peoria, Ill.

Toledo Manufacturing Company, East Toledo, Ohio, to make automobiles and supplies; capital, $100,000.

The Holmes Automobile, Engineering and Power Company, of Chicago, with a capital of $200,000, to manufacture automobiles.

Packard Motor Car Company, of New York city. Capital, $10,000; directors, G. A. Laughlin, F. D. Peale and R. Connelly, of New York.

Kendall Metallic Cushions Tire Company, in Rhode Island, to make and sell automobiles and parts; capital, $1,000,000. President, H. A. Church; treasurer, W. A. Campbell, both of Providence, R. I.

Des Moines Auto Company, Des Moines, Ia., reorganized; capital stock, $25,000. Officers: President, C. B. Paul; vice president, W. E. Davy; secretary, G. M. Read; treasurer, J. E. Paul, who, with C. J. Kephart, compose the board of directors.

The Matheson Motor Car Company, Grand Rapids, Mich.; capital, $600,000. Officers and board of managers: Chairman, Charles W. Matheson; secretary, George Clapperton; treasurer, Frank C. Matheson. William Kimmerly, Dan C. MacKay, John B. Hedges, Glen J. Barrett and Ed. Owen are the other stockholders.

A. L. Dyke Automobile Supply Company, Incorporated, St. Louis, Mo., succeeding A. L. Dyke, to engage in manufacturing, buying, repairing and selling automobiles, parts, supplies and fixtures, and to conduct storage rooms, etc. Capital stock, $10,000; president, A. L. Dyke, and shareholders, A. L. Dyke, Carrie J. Dyke, Charles Peters and Thomas B. Edwards.

The Cooley Epicycloidal Engine Company, at Trenton, N. J., with an authorized capital of $10,000,000, to acquire from the Cooley Epicycloidal Engine Development Company patent rights pertaining to rotary fluid motors, meters, etc. The incorporators are Charles S. Farquhar, George S. Taft, John F. Cooley, William C. Grey, Edward A. Phippen, D. A. Farquhar, H. W. Longfellow, Boston, and Matthew E. Gatley, Waltham, Mass.

THE HORSELESS AGE

...EVERY WEDNESDAY...

Devoted to Motor Interests

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COMMUNICATIONS.—The Editor will be pleased to receive communications on trade topics from any authentic source. The correspondent's name should in all cases be given as an evidence of good faith, but will not be published if specially requested.

☞ One week's notice required for change of advertisements.

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Notice to Advertisers.

Hereafter the first advertising form will be closed on Saturday and the second advertising form on Monday preceding the date of publication. Copy for new advertisements or changes of copy must be in our hands on or before Saturday in order to secure insertion in the succeeding number.

Organized for Mutual Protection.

Although it had been known for some time that a number of the manufacturers interested in contesting the Selden patent had laid down arms and agreed to recognize the validity of the patent, and although it was an open secret that the legal department of the Electric Vehicle Company was conducting a strenuous campaign among leading gasoline automobile manufacturers to win them over to some sort of agreement with regard to that patent, a great deal of surprise was shown in automobile circles last week when it became known that an association had been formed among manufacturers who agreed to take out licenses under the Selden patent and incidentally to pool all patents owned by them and to join hands for mutual protection.

At first flush this announcement is likely to stir visions of defeat of the industry in the Selden patent struggle, or of trust schemes, but careful consideration leads one to a different conclusion. If current reports are true the terms of license under the Selden patent are quite reasonable—in fact, so much so that the payment of the license fees is much less onerous than the prospect of extensive litigation to contest the validity of the patent to the last resort, even if the fight were carried on by a combination of manufacturers. On the other hand there is real need of an association for mutual protection of patent rights in the automobile industry. Numerous firms have expended thousands of dollars, and some even hundreds of thousands, in experiments before arriving at a practical, marketable design, and when they arrived at this stage the problem of raising sufficient working capital presented itself and the companies in the majority of cases were not in position financially to engage in protracted lawsuits to protect their patent rights should there be occasion for this. Here, therefore, was an ideal chance for the shark and copyist, and they were not slow in availing themselves of it. Not that a single feature was copied here and there, which would have been excusable, but in a few instances vehicles were copied in toto, making the copies exact duplicates of the originals so far as the design was concerned. The fact that orders were plenty with the original manufacturers, and expenses occasioned by experimental work were heavy, made them fight shy of infringement litigation. At the same time a goodly proportion of the copyists were financially irresponsible, and while in this case they were not in a position to make any serious competition, they brought the industry into disrepute. These abuses the newly formed association proposes and bids fair to eradicate.

The idea of a trust is, of course, a misconception, as the business of the various members will remain entirely independent and there will still be plenty of competition. It is not the object of the organization to restrict competition in general, but to cut off illegitimate competition. This proceeding was also indicated in order to keep the market clear of cheap and unreliable vehicles with which it promised to be flooded if nothing was done to prevent the unrestricted copying of standard types of vehicles; in other words, in order to maintain the quality of construction of American automobiles.

It seems evident, and is borne out by the history of the industry, that a man who has sufficient lack of principle to appropriate

another's ideas in toto will not shrink from imposing upon the public—at "reduced prices"—cars eminently unsuited for road use. In short, a repetition of the boom and wreck of the bicycle industry threatened to overtake the automobile industry at an early period, with all its disastrous results to investors, unless some timely move was made like that which is now inaugurated. The salvation of the industry depends upon the maintenance of quality of construction, and that the latter demands maintenance of prices is too obvious to require any argument.

The arrangement by which all members of the Association are free to take licenses under any patent in the pool should also tend to greatly improve the quality of construction, as members are thereby enabled to do away with makeshift methods devised to get around the patents of others.

The time has come for the reputable manfacturers to stand together, to protect their rights and to fight abuses, and it is encouraging to see that the Association has received the support it has. It ought not to be difficult to induce those well established and reputable firms which are still outstanding to join the Association and thus form a strong and representative organization, which will be the best guarantee against ruinous patent fights and of respect for all legitimate patent rights.

Change Gear Progress.

The change gear situation in general has remained stationary during the last year. Small American cars continue to use planetary gearing; the foreign type of touring car, shifting or clash gears, and some of the pioneer American manufacturers retain the individual clutch system of transmission. While patents are constantly issued for new designs of planetary gears, it is a question whether the most advantageous combination of the planetary system has not already been found. The greatest progress during the last year has undoubtedly been made in shifting gears.

Originally two operating levers were used for shifting gears giving four speeds forward and one reverse. This was found undesirable, and some leading manufacturers then introduced a single lever with both angular or pivotal and lateral movement, working on a gridiron sector. This latter arrangement is certainly an improvement over two levers, but it still falls short of the practical ideal of a single, simple motion lever.

Recently quite a number of cars have been brought out in which the reverse and all four forward speeds are obtained in regular succession by moving a single lever from its extreme rearward to its extreme forward position. In a number of cases this end is attained by providing a cam groove plate in the gear box, which receives uniform motion from the shifting lever and transmits intermittent motion to each of two pairs of sliding pinions. That is to say, the cam groove plate transmits motion to each of the sets of pinions at certain parts of its normal range of motion only, and the set of pinions which is not being moved is securely locked in position. Instead of by cam groove plates the same object may be attained by means of other forms of intermittent gearing, such as a rack and pinion properly cut.

These improvements not only result in simpler operation of the gear, but also render it lighter and more compact. Some of the latest shifting gears are remarkably compact when compared with those of earlier cars.

Tire Treads.

Pneumatic tires are now made with three different forms of tread—the round tread, the flat tread and the sharp tread of approximately the same form as the tread of a solid tire. The round tread is the common form and is universally employed in this country. The tire with sharp tread made its appearance in England a year or more ago. The chief claim for it is that it prevents skidding in the same manner as a solid tire. From the section of these tires it is easily apparent that they are not as resilient as tires of the same diameter with a round tread. They are quite immune from puncture, however, and the non-skidding feature is also quite well recognized. The narrow tread increases the specific pressure at the contact with the ground and thereby offers greater resistance to a lateral motion of the wheels.

One would expect increased wear of the tread as a result of this higher specific pressure and perhaps a chipping out of the material of the tread, as occurs in solid tires, but the air cushion places the tread of the pneumatic tire in a more favorable position in this latter respect.

The flat tread, like the sharp tread, has the advantage that the surface in contact with the ground is invariable—i. e., independent of the air pressure in the tire. Owing to the greater width of the tread and the fact that the contact pressure is more evenly distributed over the entire tread surface, the wear of a square tread is undoubtedly less than the wear of a sharp tread, but as the anti-skidding feature depends upon high specific contact pressure it is lost with this form of tread.

Opening of the Driving Season.

Most of the automobilists who store their machines away during the winter are now taking them out again and putting them in shape for their spring runs. In the East the weather has been unusually pleasant during the month of March, and in New York city the number of vehicles seen on the streets has increased rapidly during the last few weeks.

After the vehicles have been laid up for a long time they are, as a rule, not smooth running when first taken out. Bearings are likely to gum; unprotected iron parts to rust, causing leaks, etc., and the insulation of the ignition circuits is apt to be impaired.

Most of these troubles can be guarded against by properly cleaning the parts before putting the machine in storage, but frequently this cleaning is not attended to with sufficient thoroughness. We have recently printed in our Communications columns a number of letters dealing with this subject of irregular action of automobiles when taken out after a long period of rest, and we invite any of our readers who in putting their vehicles in service again may meet with some unusual or unexpected incident to let us know of it, as we believe such incidents are of interest to other automobilists.

Practical Requirements in Jump Spark Contact Breakers.

In our last issue a form of contact breaker was suggested by Mr. Bickford, which would give exceedingly rapid breaks, known to be an essential in jump spark ignition. Mr. Bickford correctly observes that as this method of obtaining rapid breaks is quite obvious and as it is not used by any manufacturer, there is probably some radically impractical feature about it. Where this device would fail is that it would not give contact long enough to allow the current to rise to its maximum value, and as the volume of spark depends as much upon the current flowing before the break occurs as upon the rapidity of the break, nothing

be gained by employing a device would increase the rapidity of the nd at the same time reduce the max- urrent attained. In a magnetic cir- eaker or buzzer the time of contact ys sufficient to allow the current to at least near its maximum value, as rent itself causes the break and it operate the contact spring before it ained a certain strength. It is this ndition that limits the extreme rate ation of a magnetic vibrator.

lar of Automobile Dates and Events.

—A. C. A. Run to Lakewood, N. J.
l.—Eliminating Contest for Gordon ıett Cup Race.
—Motor Cycle Century Run.
—14.—Non-Stop Run of the Scottish Club, Glasgow to London.
—Start of Paris-Madrid Tourist Sec-
—21.—Commercial Vehicle Contest r the auspices of the Automobile of America.
-26.—Paris-Madrid Race.
—20.—Paris Automobile Fetes.
-Gordon Bennett Cup Race.

Distribution in the Cycles f Multicylinder Engines.

By Albert L. Clough.

ometimes a little difficult to realize, the aid of diagrams, the actions ire taking place simultaneously in eral cylinders of a gasoline engine icylinder construction, but by the simple diagrammatic illustrations ious actions are presented to the st cogently and in such a manner sist in the solution of many engine s which may arise.

istance: The state of things in the cylinder four cycle engine of the e is as follows (Fig. 1, in which areas above the diagram represent er developed and shaded areas be- resent negative work):

e first stroke of the cycle there is lly no power produced or con- in the second stroke the work is , the energy being taken from the wheel and stored in the compres- the first cylinder's charge. The roke of the cycle represents net leveloped, but is the difference be- he energy produced by the power n the first cylinder and the nega- k of compression absorbed by the ch is being compressed in the sec- nder. The last stroke of the cycle ver stroke solely, and is represent- he explosion in the first cylinder. ie most important stroke of the

ower distribution in such an en- this is thus seen to be very irregu- power production being confined adjacent strokes of unequal net nd the two other strokes represent inactivity and negative work respectively. The proposition of using a single spark coil for producing ignition in both cylinders by connecting the plugs in series is seen not to be applicable to this type of motor. The correct points of ignition are marked by stars, and it must be apparent that if a spark is allowed in the second cylinder at the correct ignition point of the first cylinder it will occur at the end of the suction stroke in cylinder No. 2, and, in case inflammation takes place, a bad "kick" will result.

The spark in the first cylinder which would take place at the correct ignition point of the second cylinder would not be objectionable, as it would occur at the end of the power stroke in cylinder No. 1.

Since in a four cycle engine forward strokes are either suction or power strokes and backward strokes are either compression or exhaust strokes, and since (in order to balance moving parts) a forward stroke in one cylinder always corresponds with a backward stroke in the other, the only possible combinations between twin cylinders are suction compression, suction exhaust, power compression, and power exhaust.

In an opposed double cylinder motor, in order to balance reciprocating parts, both cylinders must make their forward strokes together and their backward strokes together.

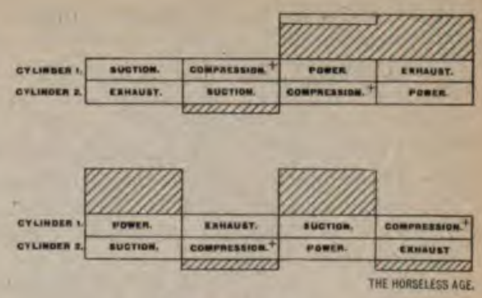
The suction strokes in one cylinder will, therefore, be simultaneous with the power stroke of the other, and the exhaust stroke of one will correspond with the compression stroke of the other. Representing this condition diagrammatically we have (Fig. 2):

The first stroke of the cycle is the power stroke of the first cylinder, the second the compression stroke of cylinder No. 2, in which energy is abstracted from the flywheel and added to the charge; that is, the work during the stroke is negative. The third stroke is the power stroke of the second cylinder and the fourth is of negative value, being the compression stroke of the first cylinder.

The power distribution in the cycle of an engine of this type is perfectly symmetrical, and, although strokes of positive and negative power value alternate, the result is a very satisfactory torque, demanding less balance wheel capacity than is called for in a motor of the twin type.

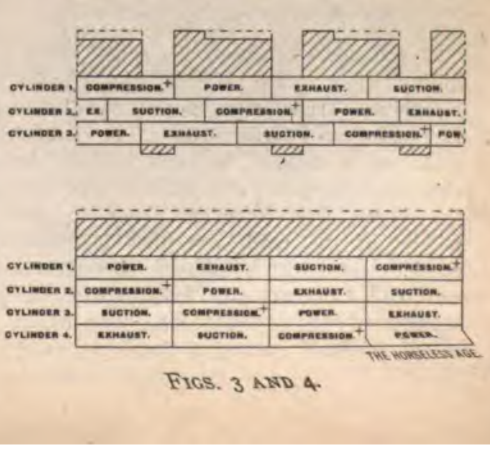
If the spark plugs of the two cylinders be connected in series from a single coil, no evil results will follow, as the correct time of firing either cylinder will correspond to the end of the exhaust stroke of the other. In case of a double cylinder opposed motor provided with two coils, it is thus possible to operate successfully in case either of the coils breaks down by connecting up both plugs in series with the sound coil.* With the twin cylinder motor this is not the case.

*(And the two circuit breakers in parallel.—Ed.)



Figs. 1 and 2.

In the case of the three cylinder engine with cranks 120 degrees apart and power impulses 240 degrees apart, the power distribution in the cycle is perfectly symmetrical, but is still somewhat intermittent, although much less so than in the case of the two cylinder engines. Fig. 3 gives a diagrammatic representation of the action of an engine of this type, and it will be noted that three times in each cycle there is a period of about 60 degrees duration in which there is no positive power being developed. These three periods are found at the close of a power stroke and while the next cylinder in rotation is finishing the compression of its charge preparatory to firing. In the first 60 degrees of each power area the power is all positive, but in the last 120 degrees the negative work of the next cylinder in rotation has to be subtracted. It is obviously impossible to spark a three cylinder engine with less than three coils without recourse to a distributer. Fig. 4 represents the power distribution in a four cylinder engine, and it is at once seen that there is a continuous production of energy throughout the whole cycle, as the power stroke of a certain cylinder is not completed before the power stroke of the following cylinder begins. At the same time that a certain cylinder is passing through its power stroke its following cylinder is passing through its compression stroke, so that the net work in each stroke of the four is the total power of one cylinder minus the compression work of the next. It is possible to ignite a four cylinder engine with two coils by placing two plugs in series on each of them, but it is necessary to choose the pairs of cylinders correctly to secure the desired results. The pairs should consist of the first and third and of the second and fourth cylinders. In this way the extra spark will always occur



Figs. 3 and 4.

at the end of the exhaust stroke in the inactive cylinder.

It is believed that these four diagrams constitute rather an interesting study of power production in gasoline engines, as they form a regular series, beginning with a very irregular form of power distribution and ending with one which is almost ideal. It should be stated that the forms of the shaded areas representing power are not intended to give any definite quantitative idea of the power produced at every instant, but merely to denote whether the power is positive or negative, and some general idea of its value. Of course, the actual power distribution can be represented only by curves of some complexity. For instance: In a four cylinder engine in which a power stroke and a compression stroke are always taking place simultaneously, the power developed would be large toward the beginning of each stroke, especially if early ignition were employed, and would taper off very rapidly toward the end of a stroke as the pressure of the expanding gases decreased and the pressure of the gas under compression increased simultaneously. It is perfectly possible, however, to combine the indicator diagrams of the separate cylinders of a multiple engine in such a way as to get the net power actually being given out. The figures given are purely diagrammatic, and nothing more is claimed for them.

The two cylinder twin engine is not so very much preferable to the single cylinder type as far as regularity of power distribution in its cycle is concerned, and it calls for a very large balance wheel. The two cylinder opposed engine, while possessed of a symmetrical action, is strongly impulsive in its working. The three cylinder engine is a decided improvement over the double opposed type in point of uniformity of torque, but it is still manifestly impulsive, as the torque changes from positive to negative three times a revolution, although this is not serious in practice. It is easy to see why the four cylinder type is so much sought after, as its power production never changes its sign and merely undulates in value four times each cycle. The balance wheel which it requires is exceedingly small, and as there is always a compressed charge in one of the four cylinders its starting is so easy as to give it great popularity.

A suit for damages arising out of the killing of a horse in the last English Reliability Trials came up at Maidstone, England, on February 27. The animal sustained a broken leg and had to be shot on the spot. The defense was that the horse was prancing about in the middle of the road, and that it collided with the car. A number of witnesses were called on each side, and the case was exhaustively gone into. The jury found for the plaintiff, assessing the damages at $300.

LESSONS OF THE ∴ ROAD ∴

Three Years with Three Carriages.

By W. P. Haines, M. D.

My first carriage, purchased three years ago, was of the heavy type, equipped with an 8½ horse power single cylinder engine with make and break ignition, supplied with current by a battery of six cells, showing a pressure of about 10 volts. The change gear gave two speeds forward, 6 and 18 miles respectively, and a reverse. The power was transmitted by a block chain to a countershaft, which in turn transmitted to the differential gear. This part of the machine was not satisfactory, on account of the loss of power and the tendency of the gears to strip, and the arrangement has since been abandoned by the manufacturer. On one occasion a new set of these gears, including the fitting, cost me $42.

This machine was exchanged for a steam carriage of the earlier type with a 14 inch fire tube boiler of 44 square feet of heating surface, double, marine, 2½x2½ engine, rated at 4½ horse power. This carriage consumed water and gasoline very rapidly. The water tank had a capacity of 25 gallons, which would barely run the carriage 20 miles on ordinary roads. The gasoline tank contained 6 gallons, which was sufficient for 30 to 35 miles, dependent upon road conditions, direction of wind, etc. The fuel being under pressure pumped up by hand was not watched as closely as it should have been, and consequently the supply often ran out away from home. Considerable labor was needed to keep up the air pressure, but this fell to the lot of my man, who did not seem to mind it very much. I expected to provide a steam air pump, but disposed of the carriage before doing so.

One of the first things to happen with this carriage was the destruction of the burner, by an attempt to raise steam fast enough to take the machine over roads which were poor but yet comparatively easy for the first carriage. Replacing the burner cost me $10, and was the largest bill I ever paid for repairs. The tires were very satisfactory and I spent for repairs during a period of eighteen months only $1.75. At the end of this time they held air for three or four weeks, although one had been filled with anti-leak solution. But these tires were never subjected to the hard use that I put those on my first carriage to, for the simple reason that the steamer did not have the power to go over bad roads at good speed.

This carriage was a delightful one to operate about town over paved streets, as it was so responsive to the throttle, able to dart ahead and around teams, and had the advantage that it was so quiet that the horses did not notice it even if driven close by them. On windy days, however, not be used, as the fire would eith out or turn back, and one could m slow progress.

On one occasion my wife was a 12 mile run to do an errand, and up to a wagon loaded with straw an by a two horse team going in the s rection, she attempted to ride by, doing this she used up all the st that the pressure fell to 20 pound next moment the carriage was en in a sheet of flame, owing to raw g being injected into the burner. Wi ence of mind she stopped, alight turned off the gasoline where it ente burner chamber, and put out the fi her gloved hands. As there was no ance she left the carriage at the r and returned home on foot. Need say, I could never induce her again erate that carriage.

Some time after this occurrence I out the boiler, owing to the failure cross head pump to work on a poo Not liking the feature of so much g under air pressure, I exchanged th cle for my third rig. My first carria equipped with top, curtains and apron, which made it very comfort travel in in wet weather; but son one had to get out and stand in t while fixing something. The s when it was first purchased, was regular runabout pattern, but I soo ed a panel seat, with top and stor tains. But it was never very satis in stormy weather, on account of fect of wind on the burner and beca rain obscured the mirror so the level could not be read, except b ping and wiping the moisture off th ror, which had to be repeated ever while. A strong head wind also great resistance to the progress machine when the top was up, sometimes could just barely crawl a

My present carriage is a low equipped with 30 inch wheels in fro 36 inch in the rear, fitted with clincher tires of a well known make. gine is a three cylinder, horizontal, oping about 10 horse power, and t riage complete weighs only abo pounds. The engine speed is contro a throttle, and the ignition is of the and break type, with current suppl a small magneto, driven by belt fr engine flywheel.

My particular vehicle was purchas ond hand, and when it arrived I considerable loss of motion in the s gear. This has since been remedied, find that the carriage handles alm easily as a bicycle. When I receive two steering wheels were kept para a tube connecting arms on the two s knuckles, this tube being placed in of the axle. One of the first thin occurred with the machine was to this tube when I ran the vehicle in corner of my barn. I have chang

arrangement by placing the tube behind the axle. When the carriage was received I could not get the full power out of it, and in attempting to run it at its full speed I sometimes fed more gasoline than I should have done. The result was that one warm afternoon, while making an 18 mile drive, I overheated the engine to such an extent that the woodwork inside the carriage caught fire. It may seem strange to some readers that the cylinder oil did not burn, but this may be explained by the fact that the manufacturers furnished me cylinder oil of very high fire test. The same thing happened once again later, and then I had the engine thoroughly overhauled by a man from the factory, since which I have had no further trouble of this kind. The vehicle was sold to me by an agent who, having lost the agency, was very anxious to sell it, and assured me that it was in perfect condition, although he must have been aware that it was not.

The seat of the carriage was hinged to the back of the body and had to be lifted to inspect the engine or to make repairs. This involved the use of a piece of hose about 10 inches long to connect the tank in the back of the seat with the water jackets of the cylinders. This arrangement was unsatisfactory, and I have discarded the hose, having screwed the seat fast to the body, and cut large holes in the seat board under the cushions, which not only does away with the leaky hose but also gives a larger space to work in. I then fastened the loose boards and cushions together, so that now to inspect the engine I merely lift the cushion.

Both of my former carriages worked with divided rear axle and this at times caused me much trouble. In the gasoline carriage there was a truss fastened at one end and passing beneath the axle, supporting a prop in the middle, and provided with means of adjustment by which the axle could be kept true. It was quite an undertaking to make this adjustment, on account of the great weight of the machine. In the steam vehicle there were two trusses, and while the rear axle construction was very stiff, the removal of the differential gear was almost a day's work. In my present vehicle the entire rear axle can be removed in a few minutes, and there is no break in it, one of the side gears of the differential being made fast upon the axle and the other to a sleeve upon the axle.

When the present vehicle was received the tires were in rather poor condition, three being old and one new; consequently they have given me lots of trouble, but the new one has been a source of more bother than the others.

IMPROVEMENTS.

A box front has been substituted for the patent leather dash, which provides ample room for medicine cases, parcels, tools, etc. I never could keep the dash tight, as the vibration loosened all the nuts I put on, and the weight of a pair of side lamps only made it worse.

The front wheels of the carriage were narrow tread and did not track with the rear wheels by about a foot. It is a fact that the narrow front arrangement resulted in easier handling than the common arrangement of standard tread, but in my case there are other things to be considered which outweigh this advantage. Having lengthened the front axle by inserting two short pieces of steel, I soon found that it was not strong enough, and bent so the wheels were closer together on top than on the ground. I then had an entire new axle made of heavier steel, which seems to stand the strain well. The fender irons also had to be lengthened, to bring the fenders over the wheels, now farther away from the body.

After the fire accident referred to I cut two square holes in the back of the seat, as large as the frame of the body would permit, to allow the surplus heat to escape. Later I joined the two openings and placed a rectangular panel in it with strips arranged in such a manner as to keep out the rain and yet permit escape of the heat. This also hides the machinery and prevents the appearance of the carriage being detracted from.

The old style sparkers with which the carriage was provided when I received it were not quite satisfactory, mostly on account of the flat steel springs with a pawl attached to their ends. These springs would frequently break, and though that would not stall the carriage, as there were always two cylinders left, yet it was annoying and quite a dirty job to fix it, on account of their being located in the crank case, the dirtiest place on the carriage. I replaced these old style sparkers with the later ones, which have a coiled spring instead of the flat one, and I have had no further trouble from this source.

The semi-elliptic springs which supported the rear of the body were so weak that in rough places on the road the body would sometimes strike the rear axle. This was easily remedied by having a blacksmith put in a pair of extra leaves.

TROUBLES.

I have met and overcome a number of troubles, but they have been few as compared with those I had with the steam rig. About the worst trouble was the lack of compression in two of the cylinders when the carriage was first received. The manufacturers sent one of their best men to fix up the machine, and I want to say right here that I have always been dealt with by them very courteously, although I did not buy the machine from them. The fire accident mentioned was due to lack of compression, but this could not happen with the newer machines, as in them the hot exhaust is carried down between the cylinders, and not on the side close to the woodwork of the frame.

Being of an inquisitive turn of mind, I one day took out the magneto and took it apart. Being called away I did not put the armature back in place until the next day, when, after replacing it, I was surprised to find that it would not give a spark. I put the magneto in my satchel and went to the manufacturers, asking them for an explanation. The first question they asked me was whether, when removing the armature, I had protected the poles of the field magnets by placing a piece of iron across them. I replied that I had not, and I found this to be the cause of the trouble. Hence I would caution any reader never to remove the armature of a magneto without protecting the permanent magnets. The trouble was easily remedied by remagnetizing.

One of the most annoying troubles has been with the belt by which the magneto is driven from the flywheel. I could not get one to hold together, although I tried riveting, lacing, fastening with wire, string and catgut—everything gave way. It does not require much time to fix a break in the belt, but one gets his hands dirty, and it is, of course, always most unpleasant to have to tinker with the machine on the road.

I am now using a belt made in one continuous piece, with a long lap seam, both glued and sewed, and the belt maker says it will hold; it has held so far, but I have not used it long enough to give an opinion. If it does not I intend to do away with the belt and use a friction pulley.

The bushing through which passes the brush holder of the magneto is very fragile, and I have broken two since August; they are inexpensive and easily replaced, but the necessity for replacement might be easily avoided if they were made a little heavier.

One wet morning while making my rounds, after having gone about 3 miles, and while running along at a good speed, the carriage suddenly made a number of jumps into the air, reminding me of a bucking horse, and then came to a dead stop. I descended, and on trying to start the engine found I could not budge it. After several futile attempts I gave it up and walked back home (about one-half mile), took my horse and finished my day's work, leaving the carriage where it was, as I thought a piston was stuck. That afternoon I hauled it home and wrote to the makers, giving the symptoms; they replied that the crank shaft was stuck in the bearing. I had my man take the caps of the bearings off, and, sure enough, the trouble was found in one of them. A little oil was applied, and the machine ran as well as ever, and the trouble might have been overcome on the road had I known where to look for it.

The High Winds and the Lime Water of the Nebraska Plains.

By W. R. Pennington, M. D.

I purchased a single seated steam carriage August 14, 1901, to use in my practice. I had never had any experience with

steam, and I found a great deal of trouble in keeping a supply of water in the boiler; in fact, in climbing a long hill I would be compelled to use the hand pump before reaching the top, and finally had to get a larger pump. My next trouble was a leaky boiler. After running this carriage about 1,000 miles the rear truss broke off at both ends, and then the front truss broke.

Then I found the tires were too light, and were beginning to give way. I also had a great deal of trouble from back firing.

I found a 3½ horse power boiler and engine were not large enough to carry two passengers up a steep hill or over muddy roads. Although my engine has never caused me any trouble I have had a great deal of trouble with the chain jumping off, and it was rather a risky job to replace a chain. The instant the chain is released steam in the cylinder acts, and if one is not careful he will get a finger or a hand caught. My chain was of the block pattern. I found it necessary to blow off the boiler after every run, and even then it would lime over. I was compelled to take out the feed water pipe from underneath the boiler every hundred miles, for it would choke with lime.

VARIED EXPERIENCES.

I have had all kinds of experience from a 25 mile an hour run to a get out and help push her up a hill. If I had good solid roads and no strong head wind and had my pump packed tight I could climb a half mile 20 per cent. grade, with one passenger, although I had to get out, take my bicycle pump and pump air every 20 miles, which was certainly a great annoyance. It was often necessary to stop the carriage and refill the cylinder oil cup every 8 or 10 miles, and I also found it did not feed regularly. The engine being exposed to the dust and weather, dust would fill the bearings.

Among the most startling of my expeences was the result of trying to carry gasoline in a 2 gallon jug until it broke on the carriage and caught fire, and came very near burning up the carriage, but I threw sand on it and put it out. I then had a galvanized tank made and carried an extra supply strapped in front of the dash board.

After I had run the carriage the first 1,000 miles, the chain, being light and of the block type, would jump off the rear sprocket, until I finally had the sprocket changed and substituted a roller chain. The tires caused me a great deal of trouble, being too small for the weight. It was impossible to climb a hill after a rain unless it happened to be a sand hill, which is always hard after a rain.

If I had favorable roads and favorable winds I could make an average of 18 miles an hour. I get the best satisfaction from my pump, boiler and general outfit when I am running about 12 miles per hour.

I find that my boiler steams better facing a wind than when going with the wind, owing, I think, to the fact that going with the wind causes a downward air pressure. I always blow off the boiler after a long run. It always took me from fifteen to twenty minutes to oil up the carriage, pump up air and refill the water tank with water before starting on my return journey. I found that about 50 pounds of air gave me air pressure for 15 miles.

I seldom took any person along with me, for I knew the horse power was too small, and when I was alone and came to a rather steep hill I would get out and walk up and let the carriage carry its own weight.

COMIC INCIDENTS.

I remember meeting two ladies in an open buggy who jumped out and ran off, leaving the team standing in the middle of the road. I don't think the team saw me at all when I went carefully past. I remember another little incident that occurred while I was making a professional trip 20 miles north. It was a lovely day, the road was perfect and I invited my daughter to accompany me on the trip. We were speeding along at a 20 mile gait when we ran into a bunch of pigs, killing one and crippling another. The pigs started to run on down the road, but their legs were too short.

DEFECTS IN CONSTRUCTION.

First, the engine is too small. It should be a 3½ inch cylinder by a 4 or 4½ inch stroke, should be encased and all the oil holes should be supplied with automatic oil cups. The steam cylinder oil cup should be a sight feed and hold oil enough for a 100 mile run. The tires, instead of being 28x2½, should be 28x3 inches. The entire frame was too light and had to be replaced, including all cones. Instead of being a 14 inch the boiler should be a 19 inch. The pump and all piping I found entirely too small and it was simply impossible to keep a supply of water in the boiler. I don't think the fire tube boiler, with its 360 half inch tubes or flues to be expanded every time your boiler gets dry, is quite the thing. I strained all the water and gasoline I used. I had a cistern dug and used rain water as much as I could, although my trips into the country took me quite often 35 miles, and in that case I was compelled to take water on the road. I ran my carriage over 3,000 miles, all told, and over all kinds of roads, and the thing that caused me most trouble was the pump, which was a curse to any owner. I would have had no trouble with leaky flues if the pump could have supplied water enough for the boiler, and I packed my pump plunger every 100 miles and would remove the fire box and the feed water pipe from underneath the boiler and clean out all the lime frequently.

I finally became so dissatisfied with my carriage that I ran her into the barn and purchased a new one of another make, which is giving me perfect satisfaction. The agent's treatment, however, I find some fault with. I would return a part for repair and would receive a very nice letter stating that the part returned was simply worn out and they had taken the liberty of replacing it and sending a duplicate by express C. O. D. I did not keep an expense account. In fact, I never want to know how much I did pay out for repairs.

One gallon of gasoline would run me 7½ miles. One gallon of water would run me 1 mile. It would take me about fifteen minutes to get everything ready for the start, including filling water tank, steam cylinder cup, oiling the engine slides, eccentric, differential, and all ready to take the seat.

Muffler Contest of the A. C. F.

A meeting of the jury in the contest of mufflers organized by the Automobile Club of France was held at the laboratory of the club in Levallois Perret recently. The jury comprised members of the Automobile Club, the "Chambre Syndicale de l'Automobile" and the Chambre Syndicale du Cycle et de l'Automobile. The tests were conducted by M. G. Linnet, the engineer of the laboratory. He established a scale of twenty divisions for noiselessness. The higher the mark the more noiseless is the muffler. All mufflers were tested on the same motor, which was first subjected to a power test without any muffler at all in order to determine the loss of power occasioned by the muffler. The four most silent mufflers were submitted to another test. The results of both tests are given in the accompanying table:

RESULTS OF THE MUFFLER CONTEST.

Official Number.	Make.	Eliminating Tests.			Final Tests.		
		Degree of Noiselessness	Volts.	Amperes.	H. P.	Loss in H. P.	Loss in Per Cent.
	Without Muffler	0	90	62	7.70	....	....
4	Chapuis & Co.	13	90	46	....	....	....
2	Ossant Frères	12	90	50	6.84	.86	11.1
7	De Retz	12	90	55	6.72	.98	12.2
8	Motocar	12	90	50	6.11	1.59	20.6
3	Ossant Frères	11	90	56	6.84	1.86	11.1
15	Rousseau	11	90	58	....	....	....
6	Megeoet	10	90	57	....	....	....
14	St. Denis	10	90	59	....	....	....
9	Ravel	10	90	52	....	....	....
11	Arnaud	8	90	57.5	....	....	....

The Florida Races.

In the races held on the Daytona (Fla.) Beach on March 26 to 28 no new records were established. On the 26th Winton drove his "Bullet" a mile in fifty-six seconds. Some trouble was experienced in getting the Mors timing device in operation, and much of the time of low tide was lost in that way. On the 27th he drove the mile in fifty-eight seconds, which poor performance as compared with the previous day was said to be the cause of a slipping clutch. H. T. Thomas in an Oldsmobile made a mile in 1:08 4-5, and Oscar Hedstrom on an Indian bicycle a mile in 1:15 1-5. On Saturday, the 28th, Winton covered the mile in 52 1-5 seconds and 10 miles in 10 minutes 26 seconds, the latter a record. Thomas' best time on Saturday was 1 minute 6 3-5 seconds and Hedstrom's 1 minute 3 1-5 seconds.

NEW VEHICLES AND PARTS.

The Cudell Twelve Horse Power Tonneau.

The vehicles built by the Cudell Company, of Aix-la-Chapelle, Germany, and marketed in this country by J. C. Brandes, are of medium weight and of the general Continental type of construction; that is to say, with upright vertical motor in front, conical friction clutch and shifting gear transmission. The 12 horse power tonneau shown herewith has the body finished in white and is a machine of very handsome appearance.

The main frame of the vehicle is made up of wood beams, reinforced with steel flitch plates. The machinery is supported on a false frame of angle iron. The frame is supported on the axles by semi-elliptic springs in front and a platform spring in the rear, which are connected to the frame by spring arms and spring clips of charcoal iron. The front axle is a solid forging with a drop in the middle and provided with the usual axle ends for the pivoted steering knuckles. The rear axle is a live axle and is surrounded by a steel shell which, with the casing around the differential and bevel driving gears, forms an oil tight casing. The bearings on front and rear axle are plain parallel, bronze bushed bearings.

The wheel base of the car is 74½ inches, the track 52 inches. The vehicle runs on wood wheels 32 inches in diameter with twelve spokes and 3½ inch tires each.

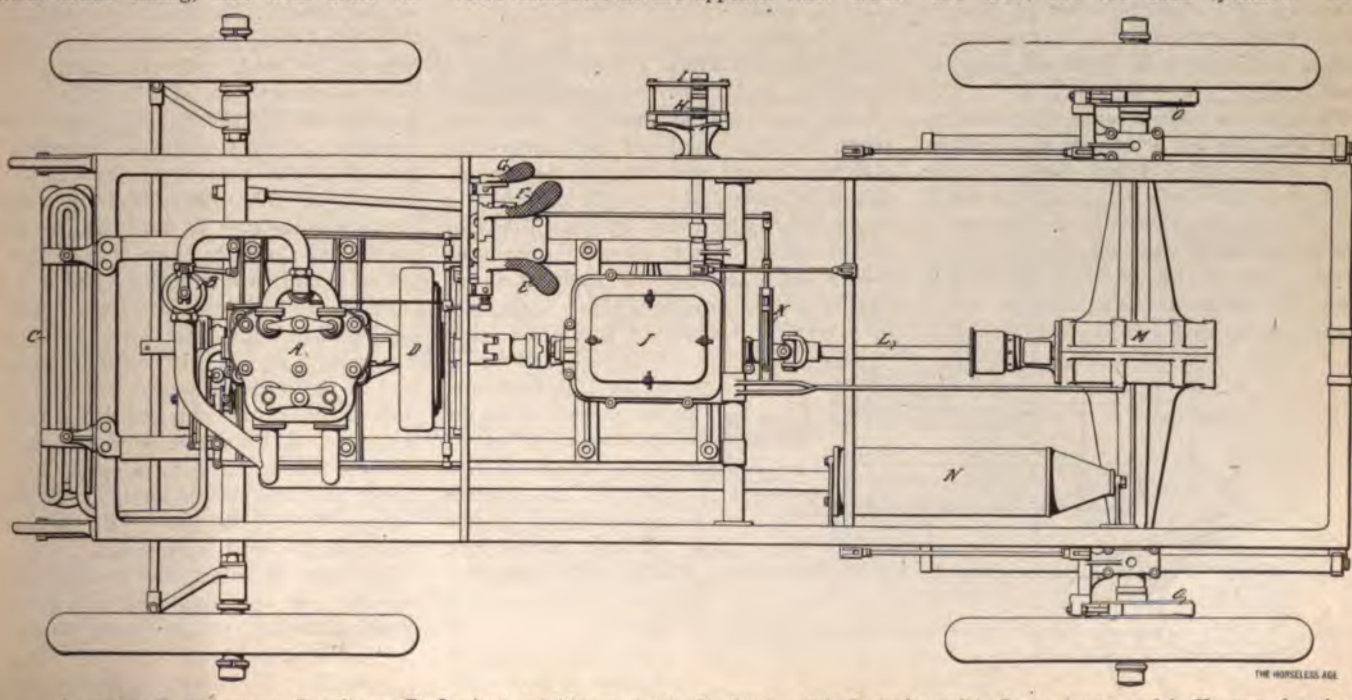
THE CUDELL TOURING CAR.

THE MOTOR.

The motor has two upright cylinders of 4 inches bore and 4½ inches stroke, which are cast in one piece with the water jacket. The cylinders are bolted down to an aluminum crank casing, cast with arms for fastening the motor to the false frame. The two crank pins are arranged opposite each other so as to obtain as good a balance of the reciprocating parts as possible. The cylinders are lubricated by splash, an oil reservoir with hand pump being attached to the dashboard, from which the supply in the crank casing may periodically be replenished. The bearings of the crank shaft are provided with special oiling arrangements, a well being cast on the casing, right over the bearing, and the oil fed into a tube extending from the bearing up into the oil valve, above the oil level, by means of a wick. The intake valves operate automatically and open directly into the cylinder. They are located near one side of the cylinder and the exhaust valves are located in valve chambers at the opposite side. Both intake and exhaust valves are of the conical poppet type and are made in a single piece. The stem of the exhaust valve is of larger diameter near the head. The valves can be removed from their casings without touching any of the piping.

The motor is fitted with a centrifugal governor, located on the cam shaft at the front side of the motor, which acts on a throttle valve in the admission passage. The governor may be thrown out of action by means of an accelerator pedal convenient to the operator.

Ignition is by the jump spark method, with current furnished by an accumulator battery. The commutator is located at the front end of the cam shaft and is entirely enclosed in an aluminum casing. Two coils are used, one for each cylinder. These



A, motor; B, carburetor; C, radiator; D, flywheel and friction clutch; E, clutch pedal; F, brake pedal; G, accelerator pedal; H, gear changing lever; I, emergency brake lever; J, change gear case; K, transmission brake; L, transmission shaft; M, differential gear case; N, exhaust muffler; O, O, hub brakes.

THE CUDELL COMPANY'S CHASSIS.

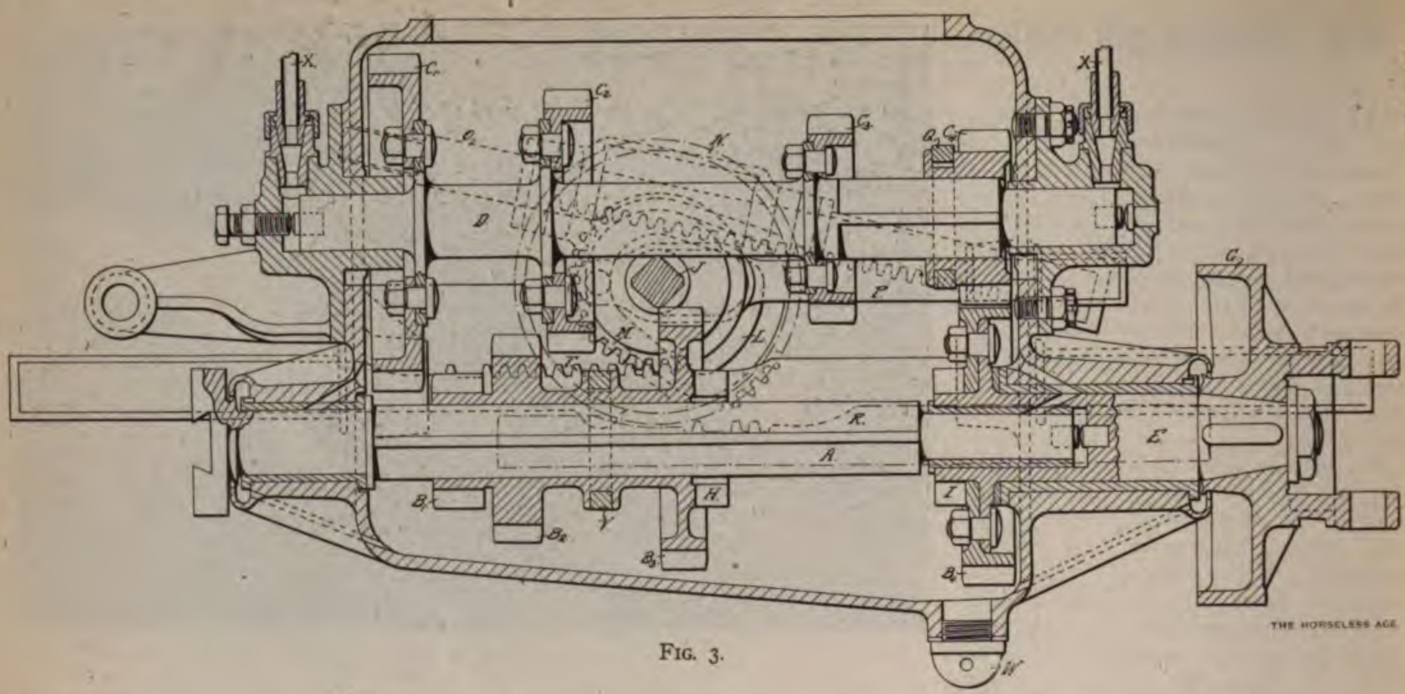


Fig. 3.

coils are provided with magnetic buzzers. The time of ignition may be varied in the usual manner by rocking the base of the commutator around its pivot support by means of a small handle on the steering post column. The coils are enclosed in a hardwood box attached to the back of the dashboard, and the storage battery is located in a compartment in the seat of the vehicle.

Six gallons of water are carried in a tank attached to the front of the dashboard under the bonnet. This water is circulated by means of a gear driven centrifugal pump, through a radiator in front of the vehicle, consisting of fifteen tubes of coiled flanged pipe, in one length, three tubes wide and five high. The motor is started by a crank in front of the machine, which is provided with an automatic release and cannot be removed from the shaft.

The gasoline tank is made of galvanized sheet steel and has a capacity of 8 gallons. It is fitted with a safety device on the principle of the Davy miner's lamp, which obviates all danger of explosion when the cap is unscrewed for filling. In addition to the oiling devices there is attached to the dashboard of the vehicle a glass vessel containing kerosene, with which the cylinders of the motor can be cleaned of gummy deposits after a run.

The power of the motor is transmitted to the change gear through a conical friction clutch composed of the flywheel of the engine and an aluminum cone faced with leather. The clutch is held in engagement by means of a cast steel spring surrounding the prolongation of the motor shaft, and it is claimed that all injurious end thrust is taken up within the device when in normal operation. The spring is enclosed within a casing, together with a universal joint transmitting the power from the clutch to the change gear shaft, and these parts are therefore completely protected from dust and moisture.

THE CHANGE GEAR.

The change gear gives four forward speeds and one reverse and drives direct on the high gear. The two shafts of the change gear are located one above the other, the upper one being the countershaft. All four speeds and the reverse are obtained by means of a simple motion of a single lever, which end is accomplished by means of a rather ingenious operating mechanism. The gear is enclosed in an aluminum case provided with a large door plate on top. Lubrication is effected partly by splash and partly by an automatic sight feed lubricator on the dashboard. Fig. 3 is a vertical section through the change gear case; Fig. 5, a horizontal section, and Fig. 7 a vertical section at right angles to the shaft.

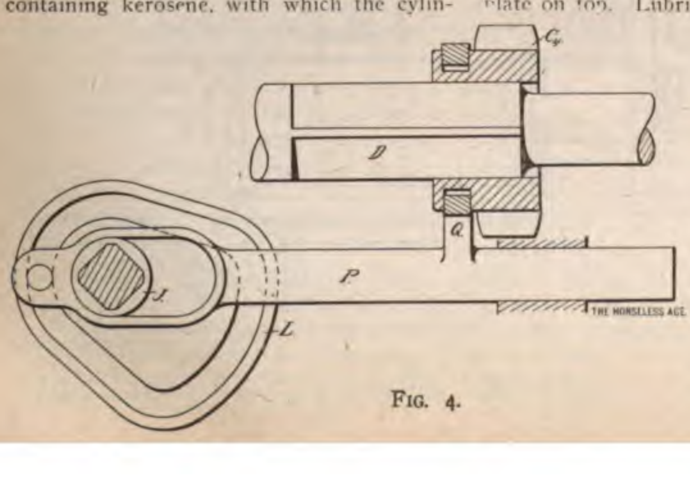


Fig. 4.

Referring to these figures, A is the first shaft of the transmission gear, which forms an extension of the motor shaft. That portion of this shaft which is located in the casing is square and carries upon it the sliding pinions. B_1 is the pinion for the slowest speed, B_2 the pinion for the second speed and B_3 the pinion for the third speed. The right hand end of the shaft A has a bearing within the shaft E, which itself has a bearing in the casing and carries inside the casing the gear wheel B_4 and outside the casing the brake drum G. The pinion B_3 and the gear wheel B_4 are provided with clutch jaws H and I respectively, and when the shifting pinions are shifted to the limit of their motion to the right, these clutch jaws engage with each other and lock the shaft A and the shaft E together, thus causing the power to be transmitted directly. To the countershaft D are bolted the three gear wheels C_1, C_2 and C_3, adapted to mesh with the pinions B_1, B_2 and B_3 respectively. The right end of the countershaft is squared and has mounted upon it a pinion C_4, with an extending hub provided with a groove to receive a shipping lever. The pinion C_4 is normally in mesh with the gear B_4, but it may be shifted to the left along the shaft D until it is out of mesh and an intermediate pinion F may then be shifted into mesh with both the pinion C_4 and the gear wheel B_4 to effect the reverse motion. It will now be apparent to the reader how the power is transmitted for the different speeds; it remains, however, to be shown how the movable pinions are operated by a single lever to move into and out of mesh in the proper succession, and this part of the mechanism is by far the most interesting.

In order to effect the various motions necessary an operating shaft J is provided, running through the gear case perpendicular to the plane through the two transmission shafts. This operating shaft is mounted in bearings in the gear casing and carries a gear K, a cam plate L, a pinion M, and

on N. The last two are cut with over only a part of their circumfer- With the gear K meshes a rack bar ich is directly connected to the gear g hand lever and serves to give mo- the operating shaft. The cam plate a cam groove cut in one of its lateral es into which engages a pin on the g rod P (Fig. 4). This shifting rod ich is guided for parallel motion by slotted and spanning the operating at one end and by being supported in ing in the casing at the other, carries pper lever Q, engaging a groove on ıb of the gear pinion C_4. The opera- haft makes one complete revolution ct all the different gear combinations, rom Fig. 4 it will be seen that the of the cam groove is such that for one-fifth of the revolution the pinion in its extreme position to the left, or f mesh with gear B_4. During this of the motion of the operating shaft termediate pinion F is shifted into with pinion C_4 and gear B_4 by means intermittent pinion N, the rack bar l the shipper lever S. The teeth on heel N and the rack bar R are so ar- d that motion is transmitted from the to the bar only at a certain part of volution of the wheel. In the position the mechanism is shown in in Fig. 6 the bar is at the limit of its motion to the right, the reversing pinion being out of gear. The bar R is prevented from shifting to the left and thus accidentally engaging the reversing pinion by the tooth *r*, which bears against the smooth part of the circumference of the wheel. The wheel may turn left handedly almost a complete revolution without moving the bar R, but if it is turned right handedly the tooth *n* on the wheel soon engages with the tooth *r* on the bar and then the shifting of the bar begins. To make the engagement positive the tooth *n* has to be given the peculiar form shown and the space between tooth *r* and the next must be made extra large. When the reversing pinion is in full mesh the bar R strikes a stop and this limits its motion to the left and at the same time the right handed motion of the shaft J.

The pinion, or wheel M, is also cut with teeth over part of its circumference only, the same as wheel N, except that it has more teeth. These teeth engage with teeth on the rack bar T which, by means of the shipper lever V, controls the set of sliding pinions B_1, B_2 and B_3. This pinion and rack movement is also provided with means insuring so called intermittent movement and locking of the shifting pinions when

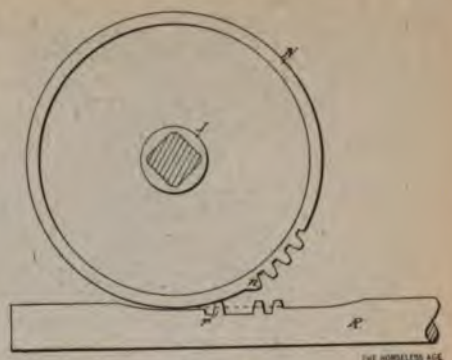


Fig. 6.

the teeth of the wheel M and of the rack bar T are out of mesh.

In the various drawings the gear is shown in the neutral position between the first and second forward speeds. If the gear shifting lever is moved back from this position the operating shaft J will turn right handedly and through intermittent gear M and rack bar T move the set of three sliding pinions to the left, thereby bringing pinion B_1 into mesh with wheel C_1. When these two are in perfect mesh the teeth of wheel M come out of mesh with the teeth of the rack T, and the sliding pinions B_1, B_3 and B_3 remain unaffected by any further right handed motion of the operating shaft. At

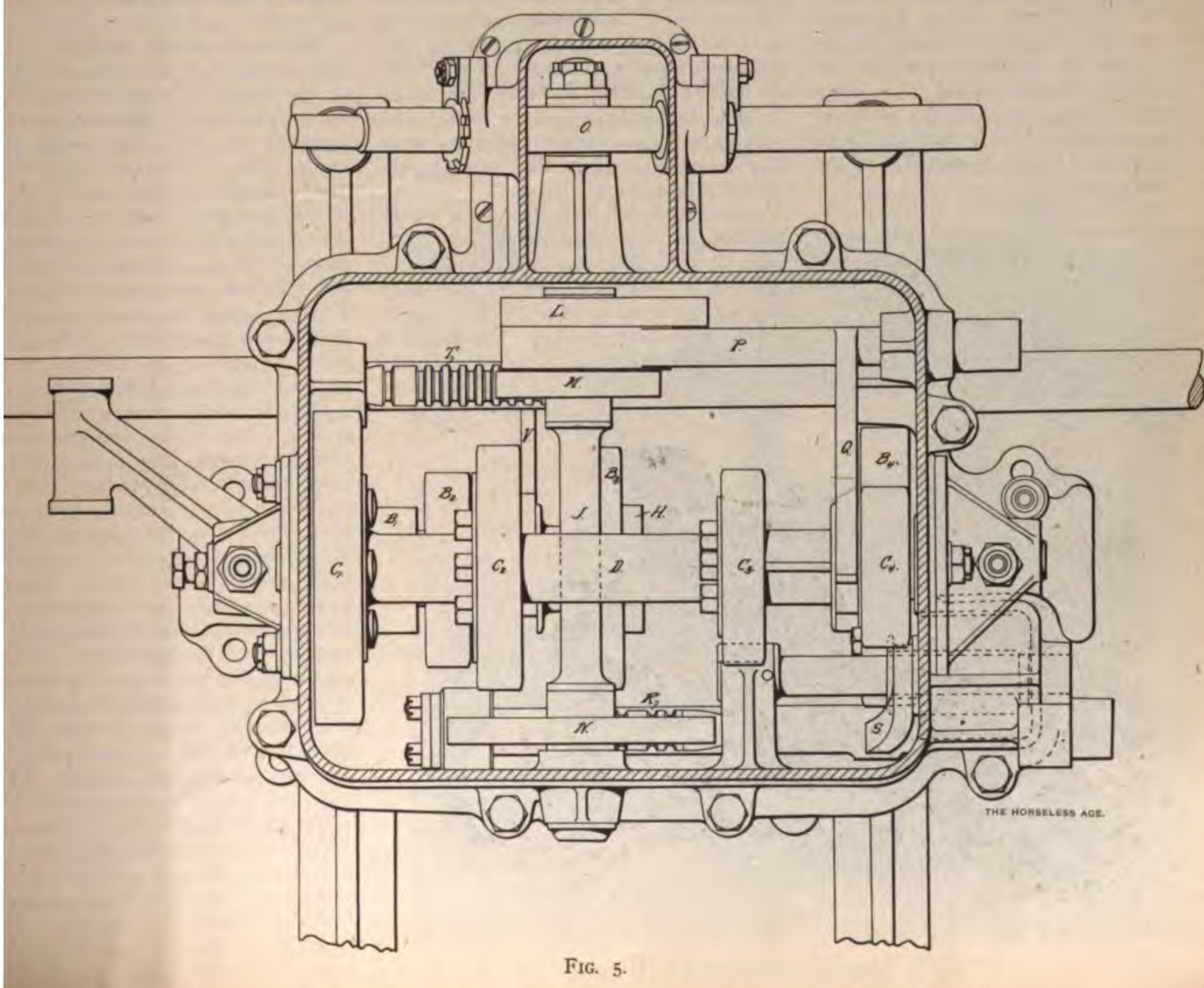


Fig. 5.

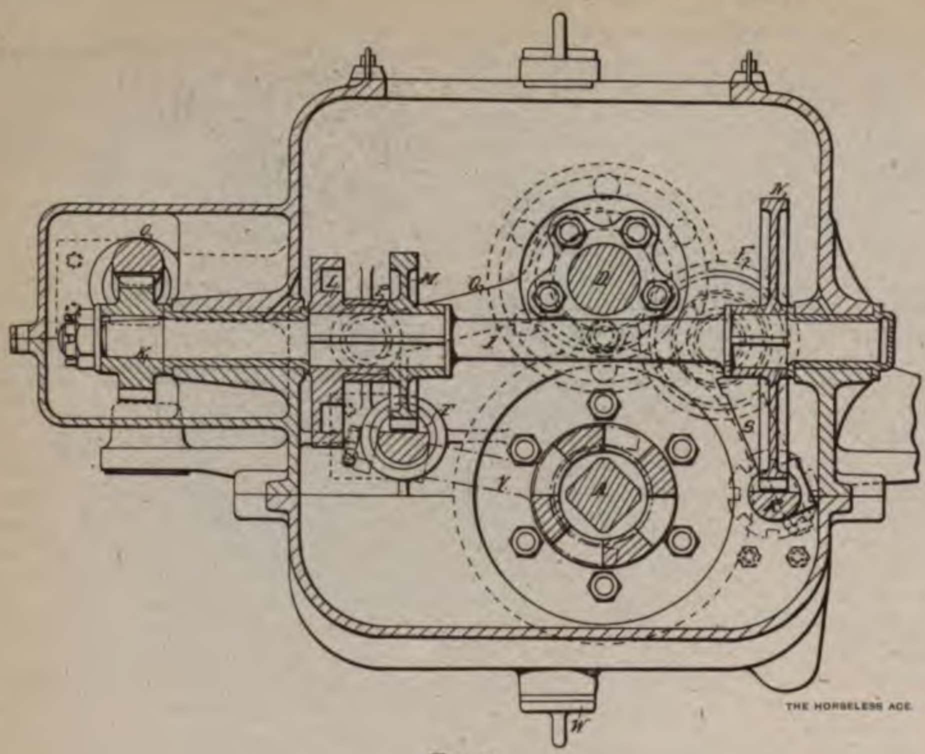


FIG. 7.

this point the cam disk L begins to move the shifting bar P to the left and thereby draw the pinion C_4 out of mesh with the gear B_4. At the same time, or a moment later, the rack bar R is engaged by the wheel N and thereby the intermediate reversing pinion F moved to the left. When the gear shifting lever is in the backmost position the pinion F is in full mesh with both the pinion C_4 and the gear B_4, and the car runs backward.

If the gear changing lever is moved forward from the position it is assumed to occupy in the drawings it will shift the pinions B_1, B_2 and B_3 to the right and soon bring into mesh pinion B_2 and gear C_2, thus giving the second forward speed; next pinion B_3 and gear C_3, thus giving the third forward speed, and finally, after B_3 has passed C_3, engage the clutch jaws H and I and thus cause the power to be transmitted directly.

Before the positive clutch is thrown in the cam disk L has again moved the pinion C_4 to the left out of mesh with the gear B_4, and while the power is transmitted directly the back gear shaft D remains stationary instead of running free, as in most gears with direct drive. This feature is one of the reasons for the very quiet running qualities of this machine.

Attention should here be called to the following features of the change gear: The gears C_1, C_2, C_3 and C_4 are readily removable from their shaft, and are therefore easily renewed when worn out. The end thrust of the countershaft is taken up by hardened pins and the rounded point of an adjusting screw, thus reducing friction to a minimum. The bearings of the countershaft are bolted to the casing. These bearings are closed at the outer end and are lubricated from a sight feed multiple oiler on the dashboard, which delivers through copper tubes XX into spaces at the ends of the shaft, which ought to ensure efficient lubrication. The bearings on the lower shaft A are provided with oil pockets at their outer end communicating with the interior of the casing, and the oil which works out through the bearings thus returns to the case. The bottom of the case is inclined and at the lowest point there is a plug W for emptying the case of oil. All the gears are cut out of special Krupp steel.

(To be continued.)

The Columbia Electric Runabout Mark XXXVIII.

The light electric runabout herewith illustrated embodies a number of new features. The battery and motor are carried beneath the body floor, which leaves the entire body space free for luggage. The body has a three point suspension, which insures absolute flexibility of the running gear and eliminates all strains. The wheels are of wood, 30 inches in diameter and fitted with 2¼ inch pneumatic tires. The wheel base is 65 inches and the gauge 50 inches. The body is suspended on side springs. The running gear complete weighs 425 pounds.

The battery consists of 20-9 P. V. Exide cells arranged in two trays. The capacity of the battery is stated to be 96 ampere hours at a four hour discharge rate. The trays have an inside length of 16⅜ inches; inside width of 10 11-16 inches, and the overall height of the complete cell is 12 inches. A single 40 volt motor is employed, the normal load current of which is 32 amperes. The motor, as stated, is slung under the body and drives the rear axle through a double reduction, the motor shaft being geared to a countershaft by means of spur gears, and the latter connected to the rear axle by means of a chain.

The controller is designed on the rheostat system and gives five forward speeds and four backward, the maximum forward speed being 15 miles per hour. An electric emergency brake is operated by the controller handle and the mechanical brake on the differential is operated by a pedal. This brake pedal is provided with means for locking it in position when it is set and at the same time cutting off the current so that no power can be applied until the brake is released. The road wheels run on one-half inch ball bearings, while the motor is equipped with ring oiling bearings. The hubs of the rear wheels are recessed on the inside and extend well over the rear axle sleeve so as to exclude all dust.

The vehicle is equipped with two 40 volt 6 C. P. electric carriage lamps on a candelabra base, a Weston combination volt and ammeter, a removable running plug and a foot signal bell. The steering is by side lever. It is claimed that one charge of the battery will suffice for a run of 40 miles.

COLUMBIA RUNABOUT, MARK XXXVIII.

l current being 32 amperes on The passenger capacity is two, ›tor is said to be sufficiently pow-able the vehicle to climb a maxi-e of 25 per cent.

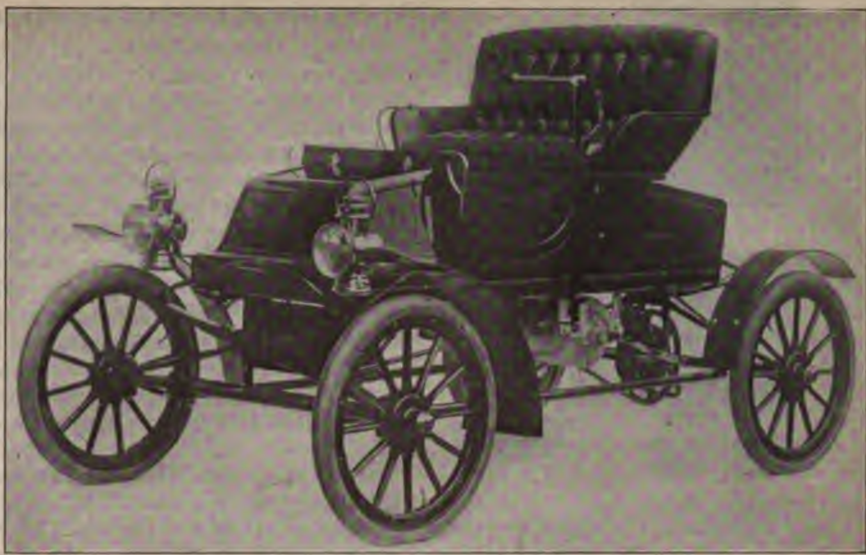
e Orient Car No. 10.

ıltham Manufacturing Company brought out the design of car llustrated. The body of this car ısiderably from their No. 9 and ed much more attractive in ap-

Car with Limousine Body.

›to herewith shows one of the cylinder Packard cars with body. This particular style was ›ecial order and the car is regu-with a standard tonneau. It is eaking a machine built on the . having a complete chassis with e body. A four cylinder vertical ing 25 horse power, with novel system, is used. This is ar-he extreme front of the machine, inarily controlled by a ball gov-ch controls the lift of the inlet simultaneously advances or re-ignition. A lever traversing a ranged concentric with the steer-is connected with the governor, ›e used to neutralize its effect. may be used to accelerate the he engine beyond the governor ıay be used to retard it. It, of ıultaneously varies both the in-ıition and the opening of the in-

kard sliding gear transmission is an interlocking device is pro-een the change gear lever and pedal, necessitating the throwing :h before changing the gear. The ıke is arranged directly upon a ed on the main driving shaft at the change gear box, and this ›vided with a universal coupling through bevel gear to the differ-ı the rear axle. All parts are encased, and, as far as possible, The oil is fed to the engine nd main bearings under pressure a pump arranged in the case of nd driven from the cam shaft. r Packard carburetor is provided gle float feed chamber and two chambers, each one arranged to ›f two cylinders. A forcer cir-water is used for cooling, and is a positively driven gear pump. tank is located at the extreme he gasoline tank is under the . A novel arrangement of dis-is used upon the rear axle, and der the half elliptic springs, and d at its forward ends with the kles. The wheel base is unusu-›4 inches. Thirty-six inch wheels vith 4 inch detachable tires. In the engine oiler a hard grease anged upon the dash, with feed



ORIENT NO. 10, BOSTON MODEL.

tubes connecting with the bearings of the transmission system.

The igniter circuit may be cut off by depressing a push button arranged in the frame of the steering wheel, and in addition a two way switch, with bodily removable handle, controls the circuit from either of two batteries. A gauge on the dash shows at a glance whether or not the water is circulating properly.

The Nelson Auto Pump.

The Nelson independent steam pump for steam carriages and wagons compares favorably with other apparatus of this kind by being of exceptionally simple construction, without either separate valves or stuffing boxes. The accompanying cut shows all the parts which go to make up this pump. The two upper cylinders are the steam cylinders and the two lower ones the pump cylinders. The cast iron steam pistons and the bronze pump plungers are arranged in the usual manner at opposite ends of piston rods, these latter passing through ground sleeves in iron distance blocks between the water and steam cylinders. Ports are cored in the pistons which register at the proper moment with passages in the walls of the cylinders and thus effect the admission and exhaust of the steam and the suction and discharge of the water. The admission and exhaust opening and the suc-

PACKARD FOUR CYLINDER CAR.

NELSON AUTO PUMP.

tion and discharge opening are located on opposite sides of the steam and water cylinders respectively. The cylinders are closed at the inner end by the distance blocks already referred to and at the ends by round plates shown in the cut. The entire pump is held together by a single bolt passing through the centre of the cylinder castings and provided with clamping yokes at either end, which bear on the cylinder head plates. The pump may, therefore, be entirely taken apart by simply unscrewing a single nut.

The steam cylinders are fitted with cast iron bushings and with pistons of the same materials. On the water end both bushings and plungers are of special bronze composition. Pistons and bushings can be refitted at trifling expense.

Among the desirable features claimed by the manufacturers of this pump, the Johns-Simmons Company, 110 Centre street, New York, are the following:

It may be operated as slowly as ten strokes per minute or it may be speeded up to the maximum steam pressure carried. It will feed the boiler from any pressure from 10 to 300 pounds. It will lift water 15 feet without priming. It will pump 3½ gallons per minute at any pressure up to 300 pounds. It will pump water heated to 200° Fahr. It is in every sense positive in its action and loses no energy by leaky valves. It has less moving parts than any pump every built. It is duplex in construction, which guarantees the maintenance of a steady stream, and which prevents all pulsation. The latest pattern pumps are equipped with lugs, which assist in sustaining the weight.

In France the Government has a monopoly on matches, and these are of exceptionally poor quality, it being a current phrase that one usually has to try six before finding one that will light. Now the Government has also secured a monopoly of the petroleum business, and a French contemporary caustically remarks that the result will probably be gasoline that will not ignite.

Association of Licensed Automobile Manufacturers.

As an outcome of the Selden patent litigation there has just been announced the formation of an association between leading manufacturers of gasoline automobiles, to be known under the above name. All of the members of this association have acquired license under the Selden patent and in addition all the patents owned by the various members will be pooled and any member granted license under any one of these patents. The organization took place on March 5 and the following officers were elected: President, F. L. Smith, Detroit, Mich.; vice president, Barclay Warburton, Philadelphia; secretary and treasurer, Henry B. Joy, Detroit; manager, George H. Day, Hartford, and an executive committee consisting of Messrs. Smith, Cutler, Clifton, Budlong and Davis, each representing one of the manufacturers.

The membership is at present constituted as follows: Electric Vehicle Company, Winton Motor Carriage Company, Haynes-Apperson Company, J. Stevens Arms and Tool Company, Autocar Company, Olds Motor Works, Packard Motor Car Company, Knox Automobile Company, Peerless Motor Car Company, G. N. Pierce Company, Searchmont Automobile Company, Apperson Brothers Automobile Company, Locomobile Company of America, International Motor Car Company, Waltham Manufacturing Company, Pope-Robinson Company, Pan-American Motor Company, H. H. Franklin Manufacturing Company and the United States Long Distance Automobile Company.

The membership list is not yet closed and it is intended to bring into the association all responsible and well established manufacturers of gasoline automobiles, as well as importers of this class of vehicles. The present members are the owners of about 400 patents on automobiles, which cover practically every part of hydrocarbon vehicles.

Among the agreements reached by the members of the association is that any member has a right to the use of any patent in the pool against the payment of a predetermined royalty. Three-fifths of the royalties will go to the owner of the patent and the other two-fifths to a fund for protecting the patents of the association against outside infringement. Licenses for the use of patents may not be issued by members without the consent of the association. Violations of this agreement will, it is said, be visited by heavy fines, and to make them certain of collection, as a condition precedent to membership, a deposit of $2,500 will be required from each member. It will be returned at the expiration of the agreement.

The formation of the association is the outcome of the infringement suit brought by the Electric Vehicle Company in the fall of 1900 against the Winton Motor Carriage Company, Percy Owen and A. W. Chamberlain for infringement of patent 549,160, granted to George B. Selden, of Rochester,

SELDEN VEHICLE.

N. Y., on November 5, 1895, and for which application was made on May 8, 1878. The first hearing in this suit came to a close on November 9, 1900, when Judge Coxe, of the United States Circuit Court for the Southern District of New York, handed down a decision on a writ of demurrer entered by the defendants, based on the claim that the patent was void for lack of patentability, overruling the demurrer and leaving the main points of contention for further proof. The defendants then organized the principal manufacturers of hydrocarbon automobiles in the country to jointly fight the patent and the defense was placed in the hands of Kenyon & Kenyon, of New York, who, in the more than two years interval, produced more than 2,000 pages of testimony in their clients' behalf. An illustration of a model filed by Selden in the Patent Office is given herewith. The patent covers broadly the combination of a compression internal combustion engine, of the liquid hydrocarbon type, running faster than the driven wheels, with a disconnecting device or means between the engine and the driven wheels, and the whole so disposed and arranged as to leave the upper part of the vehicle free for the conveyance of passengers or goods. It will be readily seen that this broadly covers all the present day so called gasoline automobiles, except, perhaps, certain forms using frictional or "variable throw" drive which are not now in extensive use.

Mr. Day, whose office is at 100 Broadway, New York, is authority for the statement that the Association has determined that manufacturers of foreign gasoline cars shall take out licenses under the Selden patent or suffer legal prosecution for infringement.

The terms of the license are $1,000 per annum for the smaller manufacturers and $2,000 to $2,500 for the larger and a royalty of 1 per cent. on the value of all cars manufactured.

A canvass of the leading importers of French cars in New York revealed an unwillingness to discuss the subject at the present time.

Three secretaries have been appointed to carry out the work of the Automobile Club of Great Britain and Ireland. Julian Orde will be the general club secretary, Rees Jeffreys will be the literary and legislative secretary, and Basil Joy will undertake the organization of club trials, and will incidentally manage the garage.

COMMUNICATIONS.

Experiences in Illinois and Southern California.

PASADENA, Cal., March 4.
HORSELESS AGE:
having enjoyed a continuous spell
ect weather for the past three weeks
ining here today. As a consequence
od Roads Fund has lost $60, as the
na Automobile Club had booked
passengers for the Pomona tour to-
As I cannot serve the public in this
y, I will use part of the time in in-
upon your readers a brief outline
experiences as an automobilist, in
pe that some of them may be inter-

the fever while out here just a year
The first thing I did was to subscribe
HORSELESS AGE, and as I devoured
umns every week my desire to own
erate an automobile grew constantly
er. Upon my return to Chicago I
ly paid many visits to the different
es there, but bored my friends with
ons relating to their machines and
pinions of them.
d almost decided upon a certain
of gasoline machine when a friend
ad just ordered one began to un-
all kinds of trouble; and, while pos-
his inexperience had something to
h it, yet I determined not to buy a
ne whose gears seemed to strip at
ghtest provocation, whose steering
tus would run him in the ditch, and
gasoline wouldn't flow regularly.
n July I dropped in for the first time
agency of the machine which I now
nd which, strangely enough, I had
before seen fit to investigate.
ead of receiving me with a lofty, su-
ous air, as some of the other dealers
is agent immediately invited me not
take a ride around the city to see
orkings of his machine, but also to
pany him on the endurance run of
icago Automobile Club, which took
August 2.
agerly accepted the latter invitation.
do not believe I shall ever forget the
and delightful sensation (to me at
me) of riding 100 miles in an auto-
without a stop. We did stop, how-
or ten seconds, when my friend was
lled to jump out and close the cock
water cooler, which had been
ed open as we went through some
ad road with deep ridges of dried
nd which was allowing the water to
This almost infinitesimal delay,
tely due to no fault of the machine,
e agent the blue ribbon; but he had
customer nevertheless, for I was so
pleased with its performance that I
im an order at once for mine.

It is a 10 horse power, two cylinder, gasoline car, carrying four people. Although the agent assured me that I could procure a 1903 model by waiting until the middle of November, I, having made my choice at last, was impatient to procure my car as quickly as possible for two reasons: First, because I wished to not only test the car before taking it to California, but also to get as much knowledge and experience of its mechanism as I could before taking it to a section of country where at that time there was no agency, although a very successful one has been established in Southern California since I came here. Secondly, I wished to have my machine fitted up with a lot of accessories not generally furnished by the company, such as a canopy top with glass front and side curtains, which is easily taken off or put on as weather conditions demand; large acetylene gas lamps, a storage battery, side baskets, lockers under the tonneau seats and cloth pads to fit on the back of them to make them more comfortable for my ladies; a dust protector, one of the best investments I ever made; an automatic oil pump, the only absolute failure about my machine; an odometer, a gradometer, and some other ometers and extras which took a certain amount of time to put on.

For these reasons I accepted one of the last of the 1902 models turned out by the company, and the agent kept his word absolutely, as the car was shipped from the factory on the exact day agreed upon, and I took my first ride in it about the middle of last September.

After having run it in and about Chicago for possibly 100 miles, I ran it one day up to my country home at Lake Geneva, Wis., covering 82½ miles in seven hours and a half. It was after an eleven days' rainy spell, and the roads through Northern Illinois were in a most frightful muddy condition, so that for over 25 miles from near Wheeling to near McHenry, it took me four and one-half hours to plow through this mud. It was one of the best tests that a new machine ever had, and I felt, when I arrived at Lake Geneva with nothing wrong about the machine at all, that I had drawn a prize in the automobile lottery.

THE GEAR INDICATOR MISLEADS.

The only trouble I have ever had was due to my early inexperience and lack of knowledge concerning what to do in case of emergency. For instance, after having kept the machine at Lake Geneva for a short time, I ran it back to Chicago, and on the way, about 20 miles from my destination, I discovered something wrong, as I supposed, with the gears. In fact, I thought I had stripped them, for, although the gear marker pointed to the various speeds, the gears would not mesh except when I threw in what showed as the reverse gear, and then the machine would go forward. This was a poser to me, and I pushed the car into a farmer's barn and left it overnight, returning with a machinist the next day to find out what was the matter. He laughed when he saw my trouble, for the rod which threw the gears in and out of mesh had simply slipped around in its socket just enough to lift the gears out of mesh when the marker showed that they should be in mesh, and it was only a matter of two minutes to take off the gear case cover, throw the gears in right, tighten the lock nut so that the rod would not slip again, and everything was serene.

It is my firm opinion that a large part of the trials and tribulations of the newly fledged automobilist is due not only to his impatience to get himself started in his new machine, but to the willingness of the average agent to let him get started without giving him a proper knowledge of how to operate and repair his machine, as well as a complete book of instructions for him to study carefully and intelligently. All I had to go on was what I could remember of what the agent told me, and what knowledge I was able to pick up by spending a few hours a week in his machine shop during the time I was waiting for my car, and seeing various machines come in to be tinkered with and repaired.

Since then the company has issued a

BOOK OF INSTRUCTIONS,

and the agent tells me that he is also writing a much more elaborate set of notes, which he hopes to have published within a very short time. In justice to him I would say that after my departure from Chicago he kept sending me, every few days, various pages of descriptive matter and explanation about the machine, which he was able to write for this purpose. And these pointers materially assisted me after my car had come to California.

I shipped it from Chicago through the Transcontinental Freight Company, in a carload of furniture, and it came through to Los Angeles in nineteen days in perfect condition. I unloaded it there myself and ran it over to Pasadena.

As there was no agency here then I brought with me a number of extra things, such as additional tires, 21 gallons of oil, 100 pounds of rags and waste, a box of carbide, and a number of tools and accessories, for I was determined, as far as I could possibly do it, to avoid all machine shops and repair men, and to take absolute care of the machine myself. I have been able to carry this out to my entire satisfaction, for while my machine has gone into shop occasionally for some trifling matter, I have always stayed with it, and nothing has ever been done to it unless I was personally present.

Accordingly, from the time I got the machine in running order after taking out all the kinks caused by its long overland journey, it has been ready for use every day, and has never failed me in any particular whatsoever. Of course, I have had my various little troubles and annoyances, as every automobilist must surely have; for instance, I was foolish enough to allow the

machine to stand by itself on the top of a short hill leading from my house to the street, and although I thought I had locked the brake tightly enough, still, while I was in the house getting something, the machine

ROLLED DOWN THE INCLINE

by gravity and brought up against a tree, hitting it with the right front wheel and bending the axle nearly an inch out of line, and breaking one of the fenders.

If the materials used in construction had not been perfectly sound such a jar would have put the machine in the shop at once; but instead I found that, notwithstanding its bowlegged appearance, the machine could still run as well as ever, and so I kept using it for over a thousand miles until a new axle was shipped from the factory by freight, the repair to the fender being made in half a day's time by a carriage maker. I preferred to get a new axle rather than have the bent one straightened.

Another time I broke one of the brake bands on my rear wheel while stopping very suddenly to avoid a collision with a bicyclist who had swerved in front of me, but I still kept on running, and it was only two hours' work to screw on a new brake band when it came, a week later.

Once I skidded into the curbstone, which cut through my front wheel tire as if it had been struck with an axe, and the machine landed in the middle of the sidewalk. This did not even bend the axle, and I had a new tire on and was running within half an hour. My actual repair bill, outside of tires and the new front axle, does not amount to over one cent per mile.

DIFFERENCE IN GASOLINE.

When I first came to California I discovered a great difference between the gasoline procured in the East and the low grade naphtha furnished to us here. And it was some time before I could get my carburetor adjusted to this strange fuel. Having done so, however, I have stuck to the one grade and have never bothered since with my carburetor, being always careful to throroughly strain the naphtha through a very fine sieve and particularly avoiding water, which sometimes is found in the can.

While at home I could get about 22 miles out of a gallon of gasoline; here the best I can do is 17 miles, and this naphtha costs about 5 cents a gallon more. It does not vaporize readily until the engine gets hot, so that on cool mornings it is often necessary for me to prime the cylinders to get the engine started.

The one disappointment I had to contend with was the automatic oil pump, which was not supplied by the company, but which was put on afterward. It had three feeds, one to the engine, one to the water pump, and one to the rear bevel pinion. From the very start I refused to depend upon its oiling the engine; and having always oiled this by hand, giving the crank case a quarter of a cupful every 10 miles, I have known exactly the prevailing condition of affairs and have never let my engine run dry, nor have gotten oil in my cylinders or on my plugs. The automatic supply to the water pump filled the water with a deep scum of oil, which I was obliged to float off or mop out every two or three days; and I soon procured one of the grease cups with which the machine was originally furnished, attached that and avoided the second trouble. Moreover, the automatic was not so in operation, for occasionally it would work very fast, and then again it would not work at all; and if I had depended upon its intermittent operation for oiling my engine I should have been in constant and, very possibly, serious trouble most of the time.

As there was no special necessity for an automatic pump to oil the rear pinion I procured an oil cup to take its place there, and I sent the automatic back by express to the agent, who agreed like a "white man" to refund to me the cost of putting it on. The makers of the automatic have since acknowledged that they furnished the wrong kind of pump for my machine.

No doubt there are automatics which will work, but if a man wants to know just where he stands all the while, let him do his own oiling, and then he can be sure of results.

HOW THE TIRES STOOD UP.

My principal tire trouble has not been with outer punctures, but with inner ones. For, with the exception of the result due to skidding referred to above, every time one of my tires has deflated I have found a hole in the extreme under side of the inner tube next to the rim. Whether this has been due to a grain of sand getting in alongside of the valve stem or to some irregularity in the cloth lining the bottom of the inner tube, I do not know. And it seems a very strange circumstance that this should repeatedly occur. The outer casings which I am using are excellent and are wearing very well indeed. One of my front wheel tires has never been off, nor have I had to pump it up since I came to California last November. The same conditions prevailed with the other front wheel until the skidding experience. All the pumping that I have had to do has been with the rear tires.

The valves of my engine seem to be practically perfect. I have never had the exhaust valves ground at all, and have only had the inlet valves ground once, simply for precaution's sake. Thinking that some day valve trouble would make its appearance, I ordered from the factory a pair of new inlet valve stems, but I have never used them, and from present conditions I doubt if I ever shall.

The one point about my machine which I have to watch very carefully is

THE VIBRATOR.

This requires frequent adjustment, but it only takes me about five minutes to do it, and as long as I understand the mec ism of it I can easily tell when the p num points need polishing or the vibr block should be tightened by screwin the bushing.

In my 3,000 miles of running I used only five spark plugs, two that inally came with the machine, one which I tried and which soon gave out, those at present in the cylinders, on ing a mica plug. These I have use nearly 2,000 miles of running, and still seem to be as good as new.

I have used up two sets of dry batt and have had my storage battery charged about four times. For ordi running I would just as soon have th batteries as the storage, for my last s dry cells ran me between 600 and 700 r which is equivalent to double that tance in the 1903 model, that havi sparking coil which does not waste a s in the idle cylinder, as mine does.

TOURING IN CALIFORNIA.

Those who read my recent accou the Redlands run of the Pasadena mobile Club can readily understand ideal conditions prevailing in Sou California for the automobilist. V every road is not as perfect as the way from Pasadena to Redlands and erside, and while sand and chuck hole very often met with, still an average to 75 miles a day can be covered b active automobilist without the slig difficulty, as he tours to the num points of interest in the garden sp Southern California.

When 10° below zero is being ex enced at home, a trip in the autom to Santa Monica-by-the-Sea or Red Beach, a dip in the ocean, a siesta pavilion surrounded by climbing rose palm trees, a run home through or and lemon groves, with the odor o blosoms on either side of the high make one feel contented with the world exhilarated with the sense of keen p ure.

During the past ten days I have no less than six tours to the diff towns and resorts within a radius of miles around Pasadena, and have co very close to 600 miles. One day machine loads of club members wen to the mountains south of Covina wolf hunt. Several hundred people neighboring towns had congregate different points in the vicinity, and idea was to drive the wolves, jack ra wild cats and other animals into a na gully or corral, where they were to be patched by the dogs accompanying hunters.

We went toward the mountains a as the road would permit us and struck off up the grassy side of the s pushing onward and upward until machines rested on the top of one o smallest mountains, giving us a

view of the Sierra Madre Range towns in the valley between. ng our machines here we

JOINED IN THE HUNT

we could; but owing to a lack of ation it proved to be a failure as the animals were concerned, al- individual bands of men on horse- old us they had secured several apiece, one party securing two wild The picnic part of this trip, how- as most enjoyable, and well repaid he effort of climbing such a long, ade.

ongest recent tour was through a of the towns south of Pasadena— , Fullerton, Anaheim, Orange, and Santa Ana, ending up at the hica Gun Club on the coast, where panion and myself spent the night, g to Pasadena the next day, and altogether about 130 miles. The rough this section are not nearly l as they are east of Pasadena in nona district, and we found that f them had recently been graded, fast traveling absolutely out of stion, although later on when they hardened and beaten down they in first class condition.

test 60 mile run was up to the Pass he mountains above San Fernan- road leading from Pasadena clear the mountains above the Southern tunnel near Saugus being as and as level as almost any boule- Chicago. We picnicked near an ed oil well, my sturdy little ma- aving climbed the steep grade al- the summit of the Pass as though essed the instinct of a mountain And on our return we passed three elds of golden poppies, each field y five or six acres in extent, with of the bright blossoms carpeting untain slope; and we stopped and as many of these glorious, almost , flowers as our baskets could

rceptible grade runs down from do to Glendale, where we turn off ne to Pasadena, through Eagle Valley, and on one stretch, with e spark advanced, the machine did over 10 miles in thirty-five minutes. there are many higher powered es in Pasadena, and many more usly fitted up, still my machine o have gone wherever the others limbs all the grades just as well as the rest, and on the level stretches old my own with any of them in f speed and ease in running.

TRACY C. DRAKE.

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obiles for Physicians; with ecial Reference to Conditions in the South.

HORSELESS AGE:

ge proportion of the non-technical that have appeared in automobile ing the past year have been written by physicians. Never before has there been such widespread interest in horseless vehicles and the great public, still somewhat skeptical of the automobile as a mechanism of general practicability, eagerly reads accounts of the experiences of those who have used it for business purposes. These accounts have not always been convincing, and at present the impression prevails quite generally that the motor carriage is still in its infancy and is too unreliable and its maintenance too expensive to be used even for pleasure except by the few who can afford to indulge in costly luxuries. It has seemed to this writer that of all people who use automobiles for business or pleasure the physician motorist should be able to furnish the public with the most valuable and entertaining experiences. To anyone at all acquainted with the life and work of the physician it must surely appear that if the motor vehicle be capable of affording the medical man efficient service it must be at once suitable for the most exacting work that could be required of it. When the busy physician finds that the automobile may be relied upon to furnish him with a safe, rapid and economical means of conveying him on his professional rounds, then we must admit that the motor car has reached a stage of development which entitles it to an important place among the most useful of the mechanical contrivances of latter day civilization. When that time has been reached then one may feel assured that the auto is no longer a thing for pleasure and sport alone, but a mechanism which will speedily revolutionize many departments of human affairs.

On reading some of the glowing accounts of auto experiences written by physicians, one might suppose that the self propelled carriage had already reached its full development and at this date is as reliable and economical in its operation as the time honored horse and buggy. After considerable experience with automobiles in my practice I must say that I cannot share in the optimism of some of my medical brethren as regards the reliability of the up to date auto. In spite of some disastrous and highly expensive experiences, I am still an enthusiastic motorist, and would not do without an auto if the expense and vexations incident to its operation were doubled. Any physician would find an auto a most convenient thing to have in the performance of his professional work, but I must say that he who depends entirely upon one will be sorely disappointed in this world and his prospects for eternal bliss seriously curtailed in the next.

Inasmuch as one cannot expect the most highly developed mechanism to do its work day after day without occasional breakdowns, the physician cannot rely upon one machine to do his entire work. The exacting character of his work makes it absolutely necessary for him to have a conveyance which can be relied upon at all times. Accidents are constantly happening to the most carefully looked after automobile, and such a trivial matter as a punctured tire, a broken ball or defective brake would be sufficient in many cases to deprive him of the use of his vehicle for many hours, and in the meantime his business and his patients would suffer. With two machines it might be possible for him to do his work promptly, for then he might hope to have at least one in condition for service at all times—but there are not many who could afford the expense of such an investment. No matter to what state of perfection a mechanism is brought, it will continue to have its limitations, and I fear the day is yet far distant when we might hope for a horseless vehicle which may be relied upon for continuous service. Such an event is not to be hoped for until the great demand for vehicles of the pleasure type has been supplied and the manufacturers have settled down to the realization that the future of their product depends upon its reliability for business purposes.

With all its glaring defects the automobile is one of the noblest achievements of the age and when it has reached its fullest development, then, and not until then, can the physician dispense with his horses. I would advise any physician who can afford to do so to buy an automobile, but I would warn him that he must not rely upon it altogether for doing his everyday work.

STEAM PREFERRED.

Opinion seems to differ as to the most suitable form of power for the physician's automobile. For one whose practice is entirely confined to a city where well paved streets abound, and cheap and abundant facilities for recharging exist, electric power seems obviously the best. But not many are so situated, and where rough roads and hilly regions are encountered it would be foolish to invest in this form of motive power. The writer has had much experience with operating both steam and gasoline machines, and for a physician's use he firmly believes that steam power is more satisfactory. Aside from the larger degree of reliability, the ease of operation and the extreme flexibility of the steam cars render them far more suitable for the work of the medical man. It is difficult for the writer to understand how anyone who operates an auto for business purposes, and has used a steam car, could be satisfied with the gasoline or hydrocarbon form of energy as at present applied to automobiles. The best type of steam carriage has so many points of superiority to commend it to the physician that space forbids even a bare enumeration of them. In short, I would advise the physician who is afflicted with the "auto fever" to seek a remedy by investing his money in a steamer—he will have more "things to watch," but a fewer number to hunt for.

Many suggestions are made by amateurs through these columns to manufacturers as to how they might improve their vehicles,

and it has appeared to the writer that much of this gratuitous advice could be used to the advantage of the industry, were the manufacturers inclined to follow up some of the suggestions. In operating my automobile in my medical practice I daily feel the need of some arrangement by which the machine might be held on a hill or steep incline without requiring the presence of the driver in the carriage. It is frequently necessary for the physician to stop his vehicle on a gradient, and to maintain it at a standstill it is necessary for him to block one or more wheels with stones or such solid objects as he can find. A simple contrivance for locking the wheels under such circumstances would add greatly to the safety and utility of a carriage, and it is to be hoped that some manufacturer will be sensible enough to grasp this idea and apply it.

On observing the strenuous methods that are being used by manufacturers to dispose of their products in the South, it seems queer to me that so few have seen how important it is to have a vehicle conform in tread to the standard which obtains in the South. As far as I know there is only one automobile firm in the United States which has paid any attention to this matter, and this firm has probably sold more self propelled vehicles in the South than all other firms combined. It is a distinct advantage to any carriage to have it track, no matter for what purpose it is used. It is utterly impossible for a physician's car to traverse all sorts of roads (as it must every day) unless its tread conforms to the ruts of the roads. An auto which tracks is worth to the physician 50 per cent. more than the one which does not. For some reason unknown to the writer the tracks of the South are four inches wider than those of the North and West. This difficulty in securing a carriage of the standard tread will doubtless vanish when the auto manufacturer begins to plan his vehicles for business purposes. When he does this, the demand for motor carriages will be far greater in the South than it is at present, and then the physician may dispense with his horses.

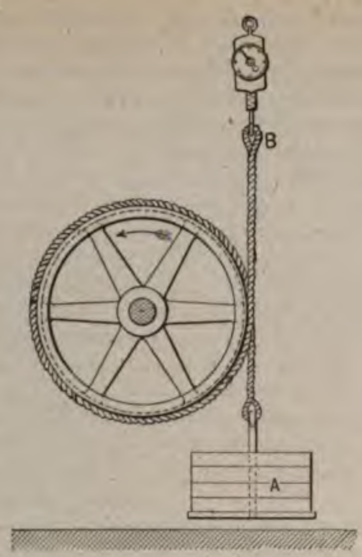
Robert W. Gibbes, M. D.

Testing Brakes.

Editor Horseless Age:

I am a subscriber to and constant reader of The Horseless Age and have built during my spare time a small gasoline engine which works very nicely. I now want to know how to construct a brake to determine the brake horse power. Will you kindly describe the construction of such a brake in your next issue? H. G.

[Brakes for determining the power of engines are made in many different forms. The one herewith illustrated is as simple as any and is recommended by the American Society of Mechanical Engineers. A rope is wound around the flywheel once and is attached at its upper end to a spring scale fastened to the ceiling or some other



rigid support. To the lower end of the rope a weight A is attached. When the engine is turned in the direction shown the friction between the rope and the flywheel will diminish the tension at the point B and the scale indication will be reduced. To find the power the engine is developing the number of revolutions per minute at which it runs must be taken by means of a speed counter, and from this and the circumference of the flywheel the peripheral speed of the latter must be calculated in feet per minute. This is multiplied by the friction between the flywheel and the rope in pounds, which is equal to the difference between the weight A and the indication of the spring scale. This product gives the work done per minute in foot-pounds, and to obtain the horse power this value must be divided by 33,000. To get very accurate results some corrections must be made for the thickness of the rope, etc.; but for practical purposes the above described method gives results that are near enough.—Ed.]

Two Cycle Engines.

[At the request of our readers we have reopened this discussion.—Ed. Horseless Age.]

Editor Horseless Age:

The range of mixture (gasoline to air) in a two cycle engine must be maintained within narrow limits, because the cylinder is not thoroughly cleansed after each impulse. As the engine speeds up, the inability of the cylinder to clear itself results in still further fouling the mixture. This demands constant adjustment of the gasoline feed which is not accomplished in practice. Did you ever notice the blue trailing smoke that follows a two cycle automobile? Did you ever notice the pungent odor that is impressed on your senses after the automobile has passed from view? The increased consumption of gasoline in the two cycle type is the main cause of this smell (part of the charge escapes through the exhaust port), and a further cause is to be found in the burning of lubricating oil.

The intense heat of the exhaust gases passing through a port in the cylinder wall tends to distort the cylinder; it further tends to burn the oil at this port, and in many cases scores the cylinders from end to end of stroke, thus impairing the compression in the base. This immediately reduces the power and the engine now becomes more sensitive than ever.

Why is not the two cycle engine popular in stationary practice? Why is it that the two cycle engine has not been produced in large sizes for stationary purposes? It is certainly an economical engine to manufacture. Here are the reasons: Increased consumption of fuel, difficulties in cylinder lubrication, and the wearing of crank shaft bearings, which causes a loss in base compression. These statements stand out as cold, insurmountable facts.

The two cycle engine first made its appearance in England when the "Otto" patents were still in effect. These circumstances forced it into existence. The two cycle engine is practically a thing of the past in England today. Why?

I might add that the same company that built the "Caprice" (referred to in your issue of January 28) built in the same year a 42 foot launch, equipped with a 16 horse power engine of the four cycle type. This boat proved in every way to be a faster one than her predecessor, equipped with a two cycle engine of greater nominal power. The runs were made over the same course, as they were made by parties personally interested in the motors.

At moderate piston speeds the two cycle engine is at its best; when speeded up its power rapidly falls off. The four cycle engine, on the other hand, increases its power with the speed in a very steady ratio. And it is here that its supremacy asserts itself.

Daily tests made under my observation on a testing stand where two and four cycle engines are tested side by side bring these facts most forcibly to the surface.

Charles B. King.

That Mysterious Fire.

Schenectady, N. Y., March 24.

Editor Horseless Age:

I have noticed in The Horseless Age a letter from L. S. Thompson and a letter from Charles Hyde with reference to a mysterious fire which occurred in connection with a gasoline burning steam carriage.

You may be interested to know that last summer I had an experience which strongly confirms Mr. Hyde's theory.

I came into a city very late at night and happened to meet an automobile owner who was kind enough to get the automobile station opened in order that I might leave my carriage there for the night. This was about midnight and the station was closed and was not supposed to be entered again until morning. There were half a dozen machines there, one of which was of the ordinary type of American single seated gasoline burning steam carriages. I noticed that there was a gaso-

me burning under the machine, and estigation it turned out that there leak in a union in a pipe running he gasoline tank to the burner. ntly this leak had ignited from the while the carriage was running and t been noted at the time that the s extinguished. It must have been g for hours, and I have no doubt would have caused trouble before g if it had not been accidentally d.

ALBERT G. DAVIS.

eau Construction and Suspension.

HORSELESS AGE:

tice in your last issue the letter of Hanson, regarding the tonneaus of touring cars. I think that Mr. 's view is correct in many cases.

a few days ago I was shown a 20 power touring car of a well known make, the tonneau of which is about e size of that of my 12 horse power tte. I have seen many other cars p with the same kind of a body, and wondered how people of larger di- ns than Barnum & Bailey's living n could squeeze into such sardine

Hanson is also right regarding the which people sitting in the tonneau endure in most touring cars. Why se cars should not be fitted with the suspension "platform springs" like dell cars, which entirely does away e series of shocks which people have tend with in differently suspended a puzzle to me.

J. C. BRANDES.

xplosion Engine Queries.

HORSELESS AGE:

rring to the article by E. J. Stod- n your issue of March 11, I find for the work in a gas engine cylin- formula. $W = 110\, A\, V \left[\left(\frac{V}{V_1} \right)^{1/3} - 1 \right]$ a loss how to interpret this formula. you be kind enough to inform me the letters V, V_1 and A are here o represent? H. H. KENNEDY.

represents the area of the piston n square inches; V, the volume of linder from the head to the piston outer dead centre, expressed in cylinder length; V^1, the volume of linder from the head to the piston inner dead centre, expressed in feet inder length.—ED.]

eculiar Legislative Requirement.

HORSELESS AGE:

ecent bill aimed at automobiles calls vo brakes, one to hold going forward e other to hold going backward." so ridiculous as to be scarcely worth and before many years hayseed legislators will look back and laugh at themselves for being so far behind the progressive spirit of the times as to propose such useless and silly restrictive legislation. This proposed law was brought to mind by the behavior of a small dog on a wet street today. He came with a rush at the front wheel and when near it tried to stop, but all four feet skidded worse than an automobile and his nose was bumping the front spokes. He then sat up, throwing head and shoulders back and turning half over, but continued to slide until directly in the path of the rear wheel, which passed over him. He went back to the sidewalk yelping and in an entirely different frame of mind than when he came out. What he needed was "an emergency brake." Last century legislators, please notice. CHAS. E. DURYEA.

[It occurred to us when reading the bill containing the above provision that the honorable statesman who introduced it had heard or read something about automobiles which he did not fully understand. Legislators who draw up automobile bills would do well to consult some experienced automobilist if they wish to avoid making themselves ridiculous.—ED.]

Opposes the "Licensed Manufacturers' Association."

Editor HORSELESS AGE:

I enclose two clippings from the Boston *Herald* from which it appears that the Electric Vehicle Company and the defendants in the "Selden" patent suit, and possibly others equally interested, propose to appropriate to themselves the automobile industry of the country. The principal implement to be used in clubbing any daring intruders is the "Selden" patent.

Is it a fact, as it appears to an outsider, that the patent (Selden) is in danger, and withdrawal before decision is the only way out of the dilemma?

In order to obtain the consent of the defendants to the withdrawal was it required that these 400 patents, reputed to be worth untold millions, should be placed in a common pool, to be rendered impregnable by the millions of dollars to be taken from the people in return for the complicated, inefficient and uncertain machines at prices ranging from $1 to $4 per pound?

Given a driving and a driven member, is it invention to interpose a clutch whereby the driven member may be stopped while the driving member continues in motion?

Does it become invention if an internal combustion motor furnishes the power and a driving wheel is attached to the driven member?

If the scope of the "Selden" patent is as indicated above, is it not contrary to public good for the Patent Department to grant such patents as the Selden?

If the Patent Department is required, under the law, to issue such patents, should not the law be so changed as to prevent such issuing?

Is not the present method of procedure in the United States courts so costly and such a long time required before reaching a decision that no person could hope to prevail, even with right on his side, against such a combination as is reported to be formed unless he had millions? If this is so, what becomes of him for whose profit and encouragement the patent law was enacted?

I know these questions are direct, and it may not be politic to answer them. They are, in view of the combination indicated by the clippings, of vital importance to the future of the automobile industry, as the result of such combination would be exactly as intended by the parties interested, viz., to deter the investment of capital and to throttle the ambition of inventors.

FAIRPLAY.

The Pennell "Accident."

Editor HORSELESS AGE:

Will you kindly inform your readers what kind of a steering arrangement was on the automobile with which Arthur R. Pennell went over the curb and into a stone quarry at Buffalo, N. Y.?

DWIGHT GRAHAM.

[Pennell's machine was an electric stanhope steered by a tiller directly connected to arms on ordinary forked steering knuckles. We did not mention the catastrophe at the time, because the question was raised whether it was accident or design. If it was an accident the state of Pennell's nerves, owing to his implication in the scandal, was undoubtedly an important factor.—ED.]

"Driving and Steering Fore Carriages."

BASLE, Switzerland, March 17.

Editor HORSELESS AGE:

On page 313 of your issue of March 4 you call attention to a pamphlet entitled "Driving and Steering Fore Carriages: Their Past and Future." Would you kindly give the address of the publishers of the above in an early number, as I am sure this opuscule would be of great interest to many of your readers, including the undersigned.

C. BROWN.

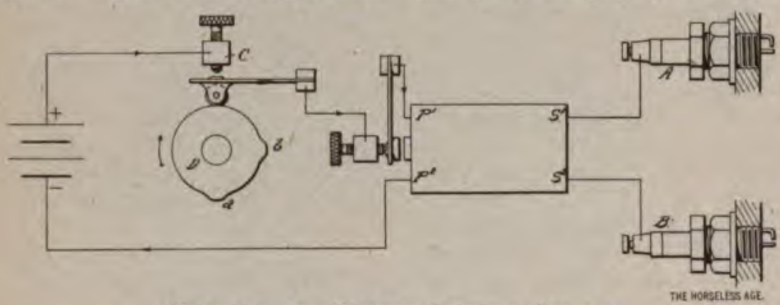
[The pamphlet is published by A. Janssens, St. Nicolas, Belgium.—ED.]

A military motor wagon test is being carried out on the continent of Europe with a Turgan-Foy steam tractor. On March 22 M. Turgan started from Paris with one of these tractors, accompanied by two machinists. The body of the tractor was fitted with a cover and with three beds for the three occupants, who sleep aboard. The tractor hauls a load of 4 tons and is to travel from Paris to Vienna, but it is to be controlled and guided by telegrams from Vienna. Each day instructions will be wired to the driver to make for such and such a city, so the War Office will see whether it could be relied on in time of war.

...OUR... FOREIGN EXCHANGES

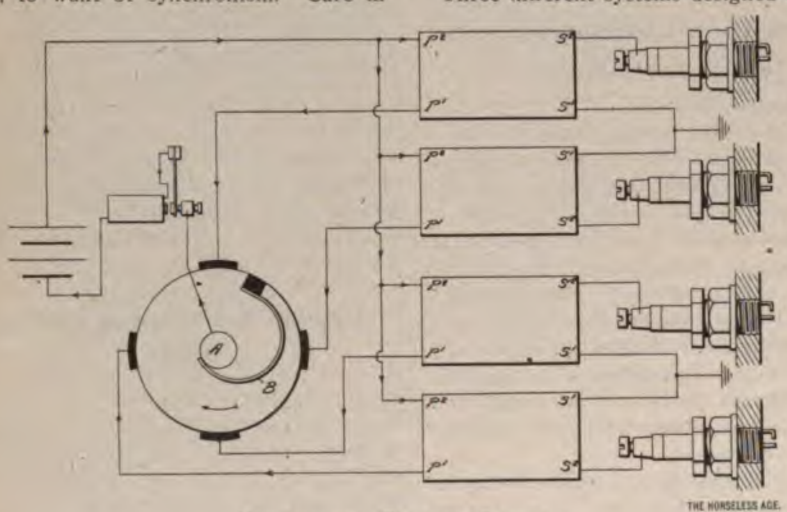
New Jump Spark Ignition Systems for Multi-Cylinder Engines.

It is often difficult to get as much power from a cylinder of given dimensions in a multi-cylinder engine as is obtained from the same cylinder in a single cylinder engine, and the cause is generally ascribed to inequality in the adjustments of valves and igniters for the various cylinders—in other words, to want of synchronism. Care in design and accuracy of workmanship can insure synchronism in many respects, but there are certain contingencies which mechanical construction alone cannot guard against. A want of synchronism may arise from differences in the capacities of the combustion chambers from leaking pistons or valves, from variations in the length of the induction pipe between the carburetor and each cylinder, or from varying resistances to the escape of the exhaust gases from the cylinders, and these are the causes which are avoidable by careful manufacture. The chief source of trouble, however, has hitherto resulted from the electric ignition systems employed, and the difficulty which is experienced in tuning two or more coils, their tremblers, and their contact breakers, so as to bring them into unison with one another.



Chenard and Walker Ignition System.

Three different systems designed to overcome this risk were recently described in the *Automotor Journal*, to which we are indebted for the following details. In each of these systems only one vibrating trembler is employed. Each of these systems comprises a condenser connected across the vibrator terminals, which has been left out in the drawings, for the sake of making them more clear.



Wilson and Pilcher System.

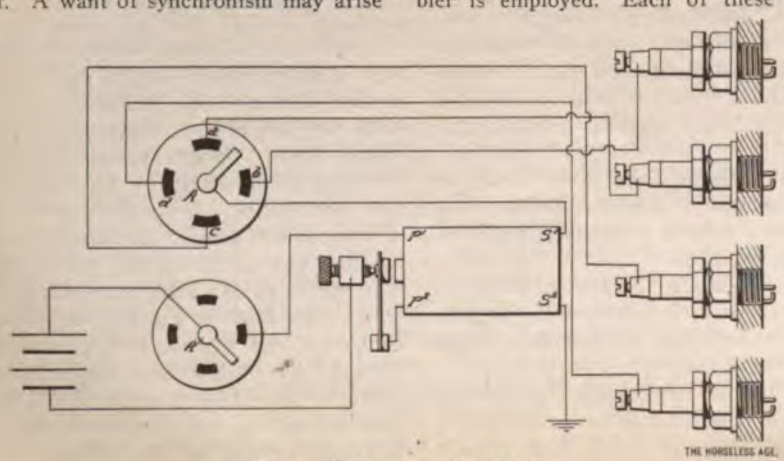
In the first of these, the Chénard-Walker system, one coil, one condenser, and one trembler serve for two cylinders; in the second, the Wilson and Pilcher system, four coils, one condenser and one trembler are used for four cylinders; and in the third, the Blake system, a single coil, with its trembler and condenser, are sufficient for four cylinders. In order to realize the differences between either of these arrangements and that generally found in use upon the majority of vehicles, it should be borne in mind that, as a rule, one coil, one trembler, and one condenser are necessary for each cylinder.

The reason why a multiplicity of tremblers is objectionable, is that each one is liable to have its own particular lag, and its own particular speed of vibration, and that since the moment and intensity of the spark depends upon its movement, the relative time at which the explosions occur may differ materially.

It will also be seen that in all three systems the commutator is so designed that synchronism is insured so far as they are concerned, and that ordinary wear and tear does not affect it. In many ordinary commutators, in which one cam operates two or more contact springs successively, it is almost impossible for the contact points against which the springs are pressed to remain in correct adjustment relatively to one another, apart altogether from the consideration that the contact surfaces of some may be cleaner than those of others. In the three systems which we illustrate the commutators are so designed that careful machining is all that is required to enable absolute accuracy to be attained.

In the Chénard and Walker scheme a single induction coil of ordinary construction, fitted with its own trembler, has its two secondary terminals, S^1 and S^2, connected to the insulated portions of the two plugs, A and B respectively. The current from the battery is led through a "making and breaking" device, C, in the commutator which is operated by the two projections, *a* and *b*, on the cam D. The primary circuit is thus completed when a spark is required in either cylinder, and since the current flows from plug to plug through the cylinder casting both sparks occur simultaneously, although only one at a time is really required. In this system, synchronism depends upon the proper construction of the cam D and its projections *a* and *b*; any lag which may be introduced by the coil, its trembler, or the contact maker D being common to both cylinders.

In the Wilson and Pilcher arrangement the primary windings of the four coils are alternately connected with the battery through an independently operated trembler, which is worked by a small electro-magnet, and is provided with a condenser. The commutator is represented diagrammatically in the



Blake System of Ignition.

drawing, where A is its half speed shaft, B the revolving contact spring, and *a, b, c* and *d* are the four stationary contact blocks against which B presses. Separate wires lead from each of these contact blocks to one end P^1 of the primaries of the respective coils, and the wire from the other terminal of the battery branches to the other ends P^2 of the primary coils. The high tension connections from the coils to the plugs are arranged in the usual manner, S^2 being the insulated terminals, and S the grounded wires. In this system, synchronism depends entirely upon the similarity of the four coils and upon the proper construction of the commutator.

In the Blake system, which is less of a new departure from previous practices, an ordinary coil, with its trembler and condenser is used, and the commutator automatically connects the battery with its primary terminals, P and P^1, each time that the spark is required in any of the cylinders. The commutator spindle A also drives a high tension switch connection, which alternately puts the insulated secondary terminal S^1 in electrical communication with the four ignition plugs, through the contact blocks *a, b, c* and *d* before the primary circuit is completed, and does not interrupt them till after the primary connections are broken. The secondary wire S^2 is grounded as usual.

The "Auto" Fuel Consumption Contest.

The fuel consumption contest which we reported in our last issue was followed on March 16 by a final contest between those standing highest in different classes. The number of vehicles in each class selected by the commission for this final contest depended on the number of contestants in that class in the original contest and upon the fuel consumption per ton kilometrique. The following vehicles were selected for contesting in this final trial:

Class I—No. 41, two passenger De Dion; No. 42, two passenger De Dion.

Class II—No. 33, four passenger Peugeot; No. 32, four passenger Peugeot (alcohol).

Class III—No. 16, four passenger Chenard-Walker; No. 17, four passenger Chenard-Walker; No. 24, four passenger Bardon.

Class IV—No. 25, two passenger Bardon; No. 19, two passenger Mors.

Class I of Industrial Vehicles—No. 26, Bardon; No. 35, Peugeot.

Class II of Industrial Vehicles—No. 1, Gillet-Forest.

The "pool of winners" was held on Monday, March 16, under the following conditions: In each class all of the vehicles were supplied with equal quantities of fuel and the contestant which went farthest with this fuel was declared the winner. The results of the first or eliminating contest were used to good advantage in settling the details of the final contest. In Class I, for example, the two vehicles above mentioned consumed in running the 100 kilometres, 4.40 and 4.44 litres respectively. These vehicles were each supplied on the morning of the final contest with a quantity of fuel slightly greater than that consumed by the least economical of the two in the original contest. The vehicles were required to again run over the same route and to run themselves out on a circular course near the Chalets du Cycle. This, it was thought, would make the contest more interesting to the public, as toward the finish all the vehicles would be close together and drop out one after another as their fuel gave out.

Twelve cars started in this contest and nine ran until their fuel supply was exhausted, three breaking down before consuming all of their fuel. An even better record was made than in the previous trial, and in the general classing the vehicle which had first place in the original trial now occupies seventh place and the vehicle which now holds first place was sixth in the original trial. The greatest distance was run by a 6 horse power De Dion (146 kilometres), and the next greatest distance also by a De Dion 6 horse power (122 kilometres). The highest place in the general classing was secured by a 12 horse power Chenard-Walker car (No. 17), which ran 121.34 kilometres on 7 litres of gasoline (75.41 miles on 1.85 gallons), which, as the vehicle weighed 2,640 pounds, corresponds to 53.83 ton-miles per gallon.

Second place in the general classing was also taken by a Chenard-Walker, and the rest followed in the following order: 6 horse power Peugeot, 6 horse power De Dion, 6 horse power Peugeot, 6 horse power De Dion, 12 horse power Peugeot truck, 8 horse power Mors, 5 horse power Bardon.

On March 25 the House of Lords of the British Parliament passed the bill sanctioning the holding of the Gordon Bennett Cup race in Ireland and the question of the race is thus settled.

The municipality of Antwerp is organizing a system for doing the whole of the street scavenging, refuse removal, and the general sanitary service by means of automobiles exclusively.

According to the census of the Ministry of Finance there are at present 8,207 automobiles owned in France, 1,673 of which are owned in Paris. One can hardly help thinking that quite a few vehicles were overlooked by the tax officials.

McNeil & Co., of Calcutta, India, have arranged with the port commissioners of that city for a gasoline storage depot at Moyapur, below Budge Bridge on the river, and expected to be in position to supply gasoline in any quantity by April 1.

The Passe Partout, which failed to encircle the world, is back in London—"a dilapidated object with no cylinder head, the chains gone, the pneumatic tires down, the front of the bonnet absent, and altogether a woeful picture of foiled ambition."

Colors for the teams in the international cup race have been adopted. The colors, proposed by the Automobile Club of Great Britain and Ireland and agreed to by the Automobile Club of France, are: Great Britain, emerald green; France, royal blue; America, red; Germany, white.

During the month of February 300 automobiles and motor cycles were imported into Great Britain, valued at $412,710. The value of parts imported is given as $60,965, making a total of $473,675. During the same month last year the total imports were $263,410. The total exports of automobiles from British ports in February amounted to $131,145.

Danish political parties are involved in conflict over the action of the Folksthing in passing a bill prohibiting the use of automobiles after sunset and fixing the speed limit, except on roads exclusively used by motors, at 7 miles an hour. Temporarily the farmers who are the authors of the anti-motor policy are triumphant, but the democrats are organizing a movement for repeal.

The race committee of the A. C. G. B. and I. have changed the proposed date of the Gordon Bennett Cup race from July 9 to July 2. In addition to the chief event there will be hill climbing trials, a kilometre speed contest in the Phœnix Park, a tour and races for motor boats in Queenstown harbor. A new item in the program is an automobile gymkhana on the race course of the Phœnix Park Club.

The London *Electrical Review* announces the early appearance on the market of a new Plauté type of storage battery for automobiles, for which the following claims are made: Only five plates are required for capacities up to 250 ampere hours—three negatives and two positives. A cell of this type, rated at 120 ampere hours and weighing 22 pounds, has been charged in less than an hour, and discharged in three hours, with a remarkably high quantity efficiency. Moreover, two-thirds of the full charge can be put in within a quarter of an hour.

Found Legislative Number Valuable.

Bradley & Twombly, junior counsel for Mr. Boyden, who presented the Higginson substitute bill to the Massachusetts Legislature, say they found the Legal and Legislative Number of THE HORSELESS AGE quite valuable to them as lawyers, as it gives the law bearing upon automobiles in different States and countries. They sent each member of the committee a copy of it.

A. C. A. Affairs.

The runs and tours committee have arranged for a run to Lakewood, N. J., on April 4. It will be unpaced, the participants dining at the Lakewood Hotel and returning as they please on April 5 or 6.

Arrangements are being made for a parade in the near future. The date has not yet been fixed, but it may possibly take place on the same day as and in conjunction with, or in contrast with the annual coaching parade.

Secretary Butler has mailed to members a digest of the new New Jersey automobile law, together with the complete law with annotations, separate blank declarations and statements to be made by automobilists who may apply for registration under the law, and also a letter upon the subject from Winthrop E. Scarritt, president of the Automobile Club of New Jersey. The secretary particularly points out that applicants should acknowledge their declarations before a New Jersey notary public or commissioner of deeds for New Jersey, and that if the acknowledgment is made before any other notary it is necessary that the certificate of the county clerk as to the notaryship must be attached.

President Scarritt's letter is an acknowledgment of the assistance rendered by automobilists to the committee in securing the passage of the law, declares that "the present act is the best and fairest automobile law in the United States," and that both automobilists and the law are on trial, the abuse of which would tend not only to bring about its repeal, but to create a legislative and public prejudice against similar legislation in other States and be productive of worse, not better, legislation throughout the country. He adds:

"The Legislature of New Jersey, and the various committees of the Legislature with whom your representatives had to deal, accepted the statement of your committee that automobilists as a class (admitting that exceptions heretofore existed) would keep within the spirit and letter of any reasonable law and would assist in upholding that law.

"Your representatives, therefore, feel that they are in the right in calling upon automobilists to observe this pledge made in their behalf.

"The Legislature of New Jersey has proceeded upon the theory that automobilists are gentlemen, and are observant not only of the statute law but of the moral law of courtesy.

"It is not necessary for me to ask you to live up to the standard; I ask you to stamp out the exception.

"Automobilists as a class are injured, their standing in the community affected, by the careless use of the machine and the reckless driving of the car in the exceptional case; therefore automobilists should not only be careful themselves to observe more than the usual courtesy on the road, but should individually and collectively set their faces in opposition to the individual who disregards the rights of others and the courtesies of the road.

"Too much emphasis cannot be laid upon the point that the way to obtain and keep good legislation is to be more than considerate of the rights of others on the highway. The existing prejudices against automobilists can only be done away with by the greatest forbearance, forethought and courtesy on the part of the automobilist to the public traveling otherwise."

The rules governing the commercial vehicle contest on May 20 and 21 have been changed and perfected and another edition with the changes made will be reprinted and distrubuted this week. Among them the following are the most important: Vehicles of the second class must carry a dead load of 1,500 instead of 2,000 pounds; those of the third class must make fifty instead of twenty specified stops on the second day's run; the former fourth class becomes Class 5, and another class which has been substituted must carry a dead load of 6,000 pounds and make twenty-five stops on the second day's run. It is also provided that the dead weight carried must be 50 instead of 75 per cent. of the weight of the car, and that any vehicle may carry 300 pounds more or 300 pounds less than the specified weight on any one of the five classes, provided the total dead weight is 50 per cent. of the weight of the vehicle.

Club Notes.

The American Automobile Club, Milwaukee, are arranging to hold a show some time in May.

Red and gold have been adopted as the colors of the Berkshire Automobile Club, Pittsfield, Mass.

The Bridgeport (Conn.) Automobile Club are talking of playing at "Hare and Hounds" with automobiles on May 30.

A committee has been appointed by the Kansas City (Mo.) Automobile Club to look into the matter of building a clubhouse.

An automobile club will be organized in St. Joseph, Mo., fifteen automobilists of the city having expressed their willingness to join.

The Binghamton (N. Y.) Automobile Club are planning an automobile parade for April 4. Fully seventy-five machines are expected to be in line.

An automobile club has been organized at Lawrence, Mass., with a membership of about twenty-five to start with, and a prospective membership of forty or fifty.

At the last meeting of the Syracuse Automobile Club, Syracuse, N. Y., Secretary F. H. Elliott proposed that the club hold a "brake" contest, in which the distance necessary for an automobile to come to a full stop, and a horse also, shall be measured for the sake of comparison.

At the regular meeting of the Brockton (Mass.) Automobile Club, on March 12, Charles Hutchins, of Rockland, and George H. Snow, of Brockton, were elected members, and Warren W. Carr was proposed for membership. The first club run will probably be held on April 19.

The Louisville (Ky.) Automobile Club has been incorporated. The following are the officers: Ira S. Barnett, president; Biscoe Hindman, first vice president; Dr. James B. Bullitt, second vice president; G. W. Hubley, secretary, and Archie M. Robinson, treasurer. The membership is twenty-eight. The executive committee has appointed an invitation committee, composed of Prince Wells, J. Kemp Goodloe and Dr. A. W. Nettelroth, and a committee on rules and regulations, composed of S. T. Ballard, L. H. Wymond and Dr. F. N. Koehler, who will endeavor to create an interest in automobiling locally and to promulgate rules to govern the club.

New Incorporations.

Ayres Gasoline and Automobile Works, Saginaw, Mich.; capital stock, $20,000.

Cadillac Automobile Company, Chicago; capital stock increased from $10,000 to $20,000.

Tivin Motor Vehicle Company, Scranton, Pa.; to manufacture vehicles of all kinds; capital, $100,000.

Holland Auto Company, New York; capital, $500; directors, Isidor Perels, Abraham Sluizer and Maurice de Vries.

Wick Company, Chicago; capital, $25,000; to manufacture automobiles; incorporators, Victor Elting, John P. Floan and Leo J. Doyle.

Colorado Springs Automobile Company, Colorado Springs, Col.; capital stock, $30,000; incorporators, E. E. Wade, E. S. Robinson and B. E. Wade.

The Rohmen Automobile Car Fender Company, under the laws of New Jersey, to manufacture patent fenders and other devices; capital stock, $100,000; incorporators, Dr. W. B. Rohmen, Charles Marshall and Louis Spotorno.

Trade Literature Received.

The Marr Autocar.—The Marr Autocar Company, of Detroit, Mich.

King's Jump Spark Intensifiers.—Chas. B. King, Detroit, Mich.

Merkel Motor Cycles.—The Merkel Manufacturing Company, of Milwaukee, Wis.

A Novel Tire Trouble.

A lion escaped from a show at Pittsfield, Mass., this week, but report has it that although blank cartridges were fired at him his keeper could not cage him until the lion bit a piece out of the inflated tire of an automobile at the garage of the Central Automobile Station. The explosion that followed is said to have so frightened the animal that he sneaked into his cage without causing further trouble.

INOR
ENTION

utomobile Club of Pittsburg has nted a charter.

Blain will open an automobile m on Michigan boulevard, Chi-

Iolland Automobile Company, Jer-, N. J., have decided to go out of

McMurtry has been appointed gen-nager of the Berg Automobile y.

on the construction of an automo-ion at Peekskill, N. Y., has been

gements are going forward to again Stevens Indurated Fabric tire on cet.

m E. Metzger has been appointed the Packard Motor Car Company it, Mich.

& Schulz, New York, will be the n agents for the Locomobile Com-America.

Koller will remove his automobile rom 33 Wood street to 26 South eet, Reading, Pa.

will be begun shortly on a plant manufacture of gas and gasoline iles at Delaware, Ohio.

ty owners have protested against ion of an automobile station for Riggs, Washington, D. C.

E. Woodruff, secretary of the f Automobile Company, Akron, d of appendicitis on March 20.

Crumrine, South Broadway, e, Ohio, is reported to be man-g tonneau seats for automobiles.

Kennedy, of the Kennedy-Warren , Toledo, Ohio, is trying to form ompany to manufacture his inven-

sets of the Forskell Motor Com-nderson, Ind., will be offered for the receiver, Howard Gates, on

Bayliss and John Eagal have partnership and will open an au-depot on Main street, Daven-

lition, 50x150 feet, will be made to ry of the Motor Cycle Manufactur-pany, Brockton, Mass. It will be as nearly as possible.

Rhode Island Automobile Club, ce, is looking for new quarters, can have storage facilities for the dation of its members.

nce Automobile Company opened 50x150 feet, at 315 to 319 Third uth, Minneapolis, Minn., on March president is H. E. Pence. They le the Cadillac, Autocar, Stevens-Franklin, Toledo, Baker, U S. Long Distance, Rainier trucks, and several French machines.

The construction of an automobile speed-way in Savannah has been suggested upon the ground that it would bring a large number of visitors to the city in winter.

A prominent builder of heavy motor trucks states that most inquiries for large self propelled wagons come from Mexico, South America, South Africa and the West.

J. B. London, of Crestview, Tenn., is reputed to have invented a tire which he claims possesses many improvements over the pneumatic tire now used on automobiles.

The Graham-Fox Motor Company, builders of compound gasoline engines, formerly located at Stamford, Conn., have opened up offices at 542 West Broadway, New York.

It is rumored that John Wanamaker will erect a new building in the neighborhood of East Fifty-seventh street, New York, to be used exclusively for his automobile department.

Plans are being drawn for a building on Temple street, New Haven, Conn., for an automobile station for the Barnett heirs. It will be 60x100 feet, of brick, and one story high.

The Interstate Transit Company, East St. Louis, Mo., has two autos made by the Conrad Motor Company, of Buffalo, N. Y., of sixteen passenger capacity, which will be put in service about April 1.

The Massachusetts Automobile Club, of Boston, has under consideration the holding of a hill climbing contest on Commonwealth avenue on April 20 and a race meet at the Readville track late in May or early in June.

Barney Oldfield announces that he has signed to drive for the Peerless Manufacturing Company, of Cleveland. He will accompany L. P. Mooers on an extensive European tour, which will include the James Gordon Bennett cup race.

A recent dispatch says that Shirley Christy, general manager in the Southwest for the Mutual Life Insurance Company, and Ben Shuster, who have been touring in Mexico in an automobile, have been thrown in jail at Cananea, Sonora, because their automobile caused a panic.

We are informed that a 100 mile race into the country and back for a purse of $1,000 was arranged between the Indianapolis agents of the Oldsmobile and Cadillac respectively, and that the Oldsmobile won the contest, as the Cadillac broke a connecting rod 48 miles from the finish.

It is reported that the plant of the International Motor Car Company, Toledo, Ohio, will pass to the control of new management, and that Col. Albert Pope, of Boston, is to assume charge. Enlargements of factory capacity and broadening of the scope of the trade are contemplated.

The New York Fire Department on March 18 tested an auto fire engine, and it is reported to have been satisfactory. The wagon weighs 7,500 pounds and can go at the rate of 25 miles an hour. It carries 1,000 feet of hose and 70 gallons of chemicals.

The Hudson County, N. J., freeholders have decided to rebuild the Belleville turnpike, in response to the request of automobilists. It constitutes a short cut from Jersey City to Kearny, a suburb of Newark. The amount to be expended is $55,000, of which the State of New Jersey will pay one-third.

As soon as Postmaster Hibbard, of Boston, secures what he considers a satisfactory auto for use in collecting mail matter he will recommend to the Post Office Department that they be adopted. He is now experimenting with several machines and finds so far that steam is the most reliable and satisfactory. This machine is capable of saving two hours and forty minutes over the horse, as was demonstrated by trial on March 25.

The Metropolitan Motor Car Company, of Fifty-seventh street, New York, are building a number of delivery cars along a rather new line of construction. The plan is to hang the motor in the middle of the body so that the style of motor can be changed at any time. Should a wagon equipped with an electric motor be unsuited to the purchaser, either a gasoline or a steam engine, it is claimed, can be substituted at any time and without affecting the performance of the car. Unlike the usual method, the motors in these cars are put in from the rear. All working parts are suspended in the body of the wagon so as to have the full benefit of both rear and front springs. Four such wagons have been turned out to date.

R. H. Macy & Co., New York, opened on March 28 a permanent but as yet incomplete exhibition of automobiles, accessories, etc. It occupies a space of 80,000 square feet, which is said to be larger than that occupied by any other similar exhibition in the world. H. L. Jespersen is the manager. The manufacturers represented at this writing are: United States Long Distance Automobile Company, Mobile Company of America, American Darracq Auto Company, E. R. Thomas Motor Company, Desberon Motor Car Company, the Cadillac Company, Oldsmobile Company, Baker Motor Vehicle Company, Franklin Manufacturing Company, Ajax Motor Vehicle Company and Renault Company. The exhibits which remain to be installed are: Loomis Auto Company, Chelsea Manufacturing Company, Shelby Motor Car Company, Sandusky Auto Manufacturing Company, Jackson Automobile Company, Flint Automobile Company, Northern Manufacturing Company, Friedman Auto Company and the De Dion-Bouton Company, of Boston.

The capital stock of the Palmer-Darnall Company, Bloomington, Ill., has been increased from $25,000 to $50,000 and three additional directors, H. M. Palmer, J. A. Cooper and W. C. Darnall, have been elected. The following officers were also elect-

ed: President, H. M. Palmer; vice president, J. A. Cooper; secretary and treasurer, W. C. Darnall; general manager, C. C. Darnall. J. A. Cooper, G. L. Merritt, W. C. Darnall and M. M. Spence have become stockholders.

Up to March 1 nearly 1,000 automobiles had been registered at Philadelphia.

F. Carl has opened an automobile line between Galveston and Harrisburg, Tex.

It is said that A. C. Neubauer, of Paris, contemplates establishing a branch of the Palais de l'Automobile in New York.

The United States exports of automobiles and parts during February were valued at $63,224, compared to $34,500 during February, 1902.

The Decker Automobile Manufacturing Company have made a proposition to the Board of Trade to locate at Binghamton, N. Y., Binghamton capitalists to form a stock company with a capital of $20,000, and the company to supply all the necessary machinery and their own site.

It has been definitely settled that the new factory of the Black Diamond Automobile Company will be located at Geneva, N. Y., and it is said that stock for $15,000 to $20,000 to purchase a site in Torrey Park and to construct the buildings will be subscribed by the business men of Geneva.

At the annual meeting of the Electric Storage Battery Company, at Albany, N. Y., P. A. B. Widener, William L. Elkins, Thomas Dolan, George D. Widener, Rudolph Ellis, Grant B. Schley, George Philler, Thomas J. Regan and Herbert Lloyd were re-elected directors, and the purchase of the Chloride Electrical Storage Battery Company, Limited, of England, was ratified.

At a meeting of the stockholders of the C. J. Moore Manufacturing Company, Westfield, Mass., on March 18, it was decided to discontinue manufacturing automobiles and automobile parts. A committee was appointed to sell the property and close up its affairs. Mr. Moore will remove to Warren, Ohio, where he has accepted a position as superintendent of an automobile factory.

Carl H. Page writes from Calcutta, India, where he went as the representative of the New York Export and Import Company, that there is quite a demand for automobiles in that country, although there are at present probably not more than twenty-five in the whole country. In Bombay there are two Locomobiles, two Renaults and a Peugeot. Some difficulty was met in obtaining gasoline, as they consider it very dangerous there and the railroads refuse to carry it.

The C., G. & V. Gearless Car.

As announced at the time of the last Paris Exposition, the firm of Charron, Girardot & Voigt, have built an eight cylinder engine with which they have now equipped a vehicle which is devoid of all change gears. The cylinders are of 100 millimetres bore and 130 millimetres stroke (4x5.2 inches), and the motor, though rated at 40 horse power, is claimed to develop 52 horse power at 800 revolutions per minute. The engine transmits its power by bevel gears to a transverse countershaft, and thence by separate chains to the rear axle. The cylinders of the engine are turned out of steel and jacketed with sheet copper, thus making them remarkably light. All of the cylinders are bolted down to a single crank chamber cast of aluminum, supported by the main frame on six brackets. There is a single crank pin for two adjacent cylinders, and the two crank pins for each set of four cylinders are set opposite each other, but the crank arms of the two sets are set at right angles with each other, so that there is an explosion at each fourth of a revolution.

A trial of this vehicle was made on the race track at Longchamps, near Paris, about fourteen days ago, at which the photo here reproduced was taken. There was a very large crowd present, and the trial is said to have concluded very satisfactorily. The vehicle is controlled by three pedals—a clutch pedal, a brake pedal and a throttle lever. The spark is advanced by means of a small handle under the steering hand wheel. It is claimed that the engine will run at as low a speed as 125 revolutions per minute. The clutch is of the expanding variety—not the usual conical type—and is said to be exceedingly smooth acting, but the experiments have shown that a low gear is absolutely necessary for starting if the vehicle is to be used on the road. The car will therefore be fitted with a two speed planetary gear in future. As the law in France requires vehicles of this weight to be fitted with reverse gear we do not see how Messrs. Charron are going to get along with anything less than a two speed and reverse sun and planet gear, which is no more gearless than any of the present American runabouts.

M. GIRARDOT IN THE EIGHT CYLINDER C., G. & V. CAR.

LEGISLATIVE AND LEGAL.

Kansas City Ordinance.

At a hearing before the police committee of the Kansas City Board of Aldermen on March 19 the committee decided to make a favorable report on the ordinance without change, but offered to introduce later an amendment to cover the requirement of placing 4 inch numbers on the side of the lamps. The following are understood to be the chief provisions of the ordinance:

Speed Districts.—Missouri River on the north, Locust on the east, Fifteenth on the south, Broadway on the west, not exceeding 6 miles per hour.

Missouri River on the north, Troost avenue on the east, Twentieth on the south, State line on the west, not exceeding 10 miles an hour.

Elsewhere within the city limits and outside of the district hereinbefore defined the rate of speed shall not exceed 15 miles per hour.

Lights.—Side lamps permanently fixed to vehicles and to be lighted at night.

License and Number.—Owner must secure a license from the city license inspector and have the register number on the license painted in red and legible figures at least 4 inches long upon the front and side of the side lamps on his vehicle.

Board of Examiners.—This board to be composed of the superintendent of streets, as chairman, and two expert automobile operators to be named by the mayor. They shall examine all operators as to capacity, skill, experience and habits of sobriety before recommending a license. The license fee is $3 for the first year and $1 for each subsequent year of renewal.

Precautionary Measures.—When horses appear frightened, operator shall reduce the speed of his automobile, and on signal from driver of frightened horse bring his machine to a standstill. The operator must give notice of his approach by ringing a bell, and in the event of an accident shall give his name and license number. Failure

to comply with the provisions of this section shall cause the violator to be deemed guilty of a misdemeanor, and upon conviction shall be fined in a sum not less than $5 and not exceeding $500.

The Committee on Public Health and Safety of the Connecticut Legislature has favorably reported an automobile bill. It provides that no motor vehicle shall be run on any highway outside the limits of a city at a rate of speed to exceed 15 miles, nor within the limits of any city to exceed 12 miles an hour. Upon approaching a crossing the speed shall be reduced until the crossing shall have been passed, and also upon meeting or passing any vehicle drawn by a horse, and if the horse appears to be frightened the vehicle shall come to a stop. No city, town or borough shall have power to make any ordinance respecting speed and any heretofore or hereafter made shall have no force. The mayor, selectmen and wardens may grant permits to any person to run motor vehicles during a specified time upon specified portions of the public highways at any rate of speed, and annex such other reasonable conditions as they may deem proper. Violators shall be fined not more than $200, or imprisoned for not more than thirty days, or both. The committee has also favorably reported a bill requiring owners to take out a license from the Secretary of State for displaying upon the back of their automobiles the initial of the State and the number of the certificate in figures not less than 3 inches high. The license fee is $1 and the fine for violation $25.

The following rules governing the use of automobiles in the parks and parkways of Louisville, Ky., have been issued by the board of park commissioners: The operator of any automobile must exhibit a permit upon demand of any park guard or official; the number corresponding with the number of this permit must always appear upon the rear of the vehicle while on any parkway or in any park. The speed of automobiles is limited to 8 miles an hour, but upon curves the speed shall not exceed 5 miles an hour; when horses show fright the operator must bring his vehicle to a full stop until the horse passes; bells and gongs must not be sounded except at street or road crossings or sharp curves. The park guards have been instructed to arrest all offenders.

The New York Assembly on March 23 passed the Doughty bill providing that the State shall share the expense of maintaining country roads when such roads shall have been constructed without State expense.

Essex, Mass., has unanimously adopted a bylaw regulating the speed of automobiles, and it has been submitted to the Superior Court for approval.

The Matthews bill regulating the speed of automobiles was passed by the Missouri House of Representatives on March 18.

Alberta W. French has brought suit at Mansfield, Ohio, for $1,000 against Joseph Leech and Huntington Brown, who she claims broke into her barn and took away two automobiles, valued at $1,650, one of which was sold for $900 and one of which was retained for some time, for which she asks $100 damages.

It is stated that the Foreman ordinance, Chicago, will be allowed to die, so far as the present council is concerned, as it has been tacitly agreed by the members of the sub-committee that it will be useless to try to pass it at the one remaining meeting. President Gray, of the Automobile Club, is quoted as saying that the club will fight any attempt to tag an automobile with an individual identification, and that while it will consent to sporting a monogram of the society it will not agree to any tagging which will indicate the private ownership of the machine.

The Johnson automobile bill has been shelved by the Minnesota House Judiciary Committee, but a compromise bill has been recommended for passage. The new bill limits the speed of automobiles to 8 miles within the city or village limit, and to 25 miles an hour on country roads. When passing any team the machine must slow down to a speed of 4 miles an hour. Each operator must secure a license, and each machine must carry a distinguishing number.

William H. Logue, Jr., representing the organized motor cyclists of New York, will invite arrest by riding in Druid Hill Park in order to have the courts decide whether the Legislature, in passing a law admitting automobiles in the city parks, did not intend to give to motor cycles the same privileges.

New Lebanon, Mass., has passed an ordinance restricting the speed of automobiles to 8 miles an hour, imposing a fine of $50 and appointing fifty special officers to enforce it. The officer making an arrest is to receive half of the fine.

The Scovel automobile bill was signed by Governor Murphy, of New Jersey, on March 23 and took effect immediately. The first license under the new law was taken out by Winthrop E. Scarritt, president of the A. C. A. N. J.

A special meeting of the ordinance committee of the Grand Rapids, Mich., City Council, for the purpose of considering some proposed changes in the automobile ordinance, was held on March 13. Among them is the prominent display of the driver's number on the rear end of the machine. To this several members of the automobile club strenuously objected, stating that they were unwilling to display their number after the manner of a hack or dray. They proposed having the machines ornamented with the initials of the driver prominently displayed, but no decision was reached, as the whole committee was not present. It was also proposed to compel the drivers to have their numbers or initials, as the case may be, illuminated at night. To this the representatives present objected.

Hearings on the proposed ordinances prohibiting the use of parks and driveways for giving instruction in automobiles and the licensing of operators of automobiles for hire, which were scheduled to be held on March 27, were postponed to April 3 at 3:30 p. m.

At the trial of the case of P. George Gow, of San Rafael, Cal., charged with violating the speed ordinance to test its validity it was attacked by defendant on the ground that it had never been properly published, was discriminatory and void; that the section which requires the chauffeur to come to a full stop within 300 feet of anyone leading, driving or riding any domestic animal, and to remain there until such person is out of the way, etc.

A bill imposing rates of toll for automobiles has been passed by the Connecticut Legislature: For power vehicles with not more than one seat, 50 per cent. more than the fares and tolls for a four-wheeled carriage and one hourse; for power vehicles with more than one seat, 50 per cent. more than for a four wheeled carriage and two horses; and for each additional person accompanying such power vehicle the same fare shall be charged as for additional passengers in carriages.

The Grim automobile bill (Pennsylvania) was read for the third time on March 23 and was then recommitted by the author to the Judiciary Committee for further consideration. The Ware bill, which has passed the House, is also pending before the same committee and it is thought that it will be amended in order to make it conform generally with the automobile laws of the States of New Jersey and New York.

Cheltenham, Pa., has restricted automobile speed to 10 miles an hour, with $10, $25 and $50 penalties for first, second and third offenses, and has appointed eight policemen to enforce the ordinance.

C. M. Doak, of St. Louis, was fined $5 on March 20 for violating the law requiring a license tag to be placed on automobiles. He is said to be the first victim of the new Missouri law.

John Danner, of Toledo, Ohio, was awarded a verdict of $400 on March 20 for injuries received by being run down by an automobile driven by Newton J. White.

Frank and John Long, of Charlestown, Mass., lost control of their automobile on March 26 and were thrown out. They were severely injured and the machine, valued at $1,800, was damaged.

Counsel for the Eisenhuth Horseless Vehicle Company on March 25 filed with the clerk of the Superior Court at Middletown, Conn., an answer to the amended complaint of Harry Metzger in his damage suit for $20,000. Metzger was injured while in their employ by an explosion of gasoline and alleges negligence on the part of the company.

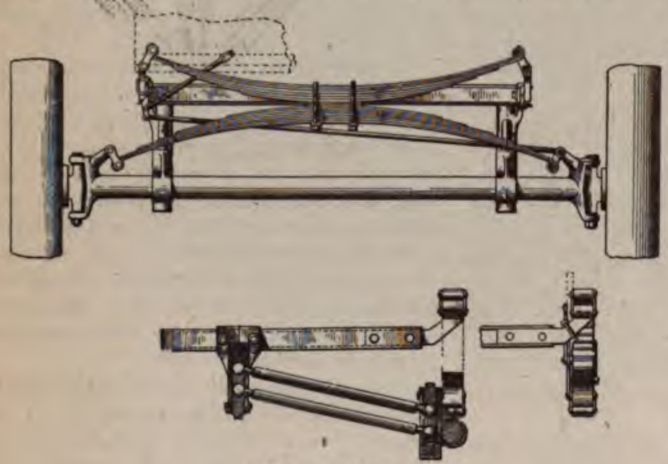
There was a hearing on March 24 before the New York Assembly Judiciary Committee on the proposition to expend $50,000,000 for good roads within the next ten years.

MOTOR VEHICLE PATENTS..

United States Patents.

721,912. Running Gear for Motor Vehicles.—J. W. Packard and W. A. Hatcher, of Warren, Ohio. March 3, 1903. Filed March 10, 1902.

The running gear is of the reachless type, with an inverted elliptic spring in front, which necessitates radius rods in front. The invention relates particularly to the construction of these radius bars. The rear ends of the bars are pivotally secured in a bracket attached to a side bar of the frame, and the forward ends of the bars are pivotally connected to a bracket having a sleeve secured to the axle. The bars are provided with spherical heads at each end. The bracket depending from the side bar of the frame has a socket extending upwardly from its lower end, and the bracket on the front axle has a similar socket. A vertical slot is formed in the wall of each of the sockets. The thrust bars are arranged parallel with one another with their spherical heads within the sockets, the bars extending through the slots on the walls of the sockets. The bars are spaced apart by blocks fitting within the sockets and having concave faces which bear against the spherical heads, and follower blocks and springs are interposed between the bases of the sockets and the adjacent heads. The heads, blocks and springs are secured in place by means of plugs, which are threaded into the ends of the sockets, the plugs also having concave faces which bear against the adjacent spherical heads of the bars. The parallel thrust bars hold the front axle rigidly against any tendency to turn upon its axis, while permitting free movement of the axle and frame vertically relatively to one another, and the compression springs in the sockets take up lost motion as wear occurs and prevent rattling of the parts.

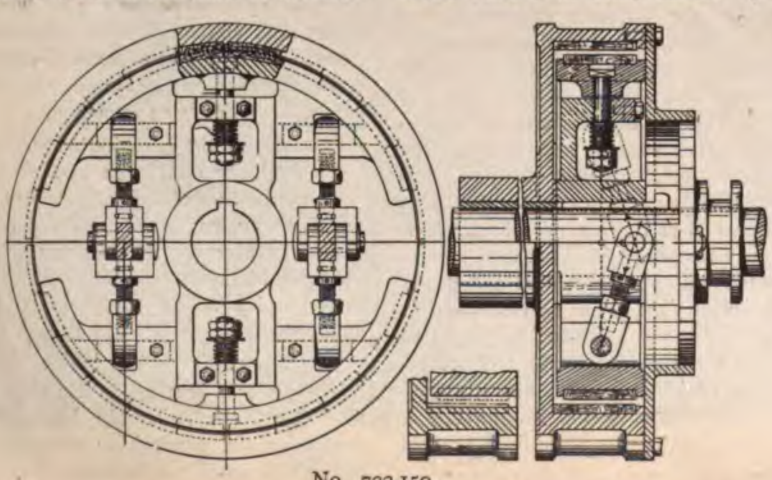


No. 721,912.

722,150. Friction Clutch.—G. L. Scott, of Rochdale, England. March 3, 1903. Filed August 15, 1902.

The boss or hub of the internal part of the clutch is provided with arms carrying segments. There are two arms or drivers, each carrying a segment, the peripheries of the two segments providing almost a complete circle. To prevent the two segments from moving outward by centrifugal force when the clutch halves are disengaged, each segment is provided with a pin or stud, passing through a flange on the arm, and a spiral spring is placed between the ledge and nuts on the end of the stud. When the clutch is in action the segments, being thrust outward, compress the spiral springs, the springs thus having a tendency to draw the segments inward toward the axis of the shaft on which the friction clutch is mounted.

To bring the inner clutch half into and take it out of action there are pivoted to each segment two toggle links, the ends of which are jawed and also pivoted upon studs centred in arms carried by a disk,

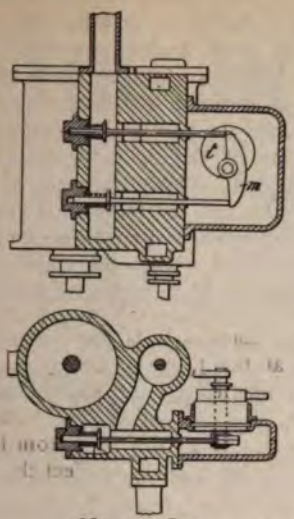


No. 722,150.

which is slidable on the shaft to
the toggle links by a sliding coll
collar and attached disk are slid
shaft by any usual well known mea
outer shell is provided with a flang
the disk actuating the toggle link
within the flange of the ring, so
flanged ring and disk effectively
the internal friction half and act as
to prevent accidents. Special m
provided for adjusting the lengt
toggle links to compensate for wea
lows: Each link is formed with
end at the point of connection
arms carried by the slidable disk
shank is arranged to be rotatabl
the jaw, but is prevented from bei
drawn therefrom. To effect this o
shank is formed with an annular re
the jawed end of the link with
sponding annular groove. Two
cupy the recess, and, while preven
withdrawal of the shank, permit
tion. The shank is screwed and
with the end of the link pivoted to
ment, so that by rotating the
shank the length of the link can b
at will, a lock nut being employed
tain the desired adjustment. To e
shanks to be easily rotated, they
provided with holes at intervals fo
ing a tool. The segments, with
ing toggle links, may be placed in
tact or removed without unke
disconnecting the driving boss a
This is provided for by means of
cap securing the studs on which th
are mounted, to the arms of the
boss. When the cap is removed
ments may be readily withdrawn.

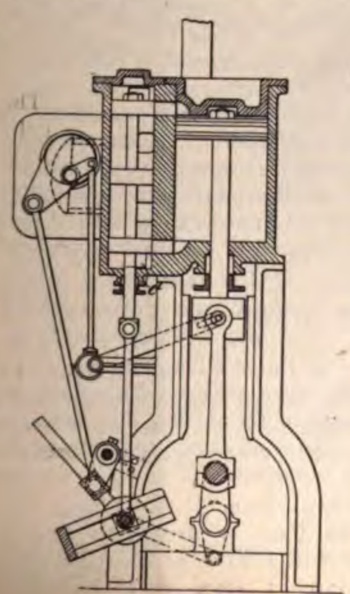
721,899. Fluid Pressure Engine.
Lanchester, of Birmingham,
March 3, 1903. Filed July 12, 190
The patentee uses a compressed
tor for starting a gasoline autom
gine. The air motor also has t
compressor, and the present inve
lates particularly to improvements
gear, whereby a change of functi
motor to compressor may be facil

A piston valve consisting of thr
is arranged upon a valve rod wo
a cylindrically bored casing. Th
and lower sides of the top and
plates, respectively, are open to
haust, and the two interspaces are
stant communication with two
pressure ports. The two cylind
munication ports open alternativel
pressure spaces or exhaust, acco
the position of the valve, which t
trols the distribution of the worki
in the customary manner, except
two independent pressure ports
place of the common port usu
ployed. The two pressure ports c
cate with the under side of two
the mushroom type and which c
cate with a common port connec
the pressure reservoir. The m
valves are arranged to open ag
pressure of the working fluid



No. 721,899.

held to their seats by light springs in addition to the excess pressure. The piston valve is operated by a crank or eccentric, and a reversing arrangement is fitted. The mushroom valves are operated by a tappet oscillated on a fulcrum by a lever, which is rocked by a rod, which in turn is rocked by a lever off the cross-head pin. The mushroom valves are not fitted with a reversing gear; but the motive stroke of the tappet is arranged to be varied, from that necessary to hold the valves permanently open to zero, when the valves will remain shut. The function of the piston valve is to control the distribution of the working fluid passing either to or from the cylinder, and thereby either to reverse the direction of motion or when the engine is being driven by superior force to change its function from that of motor to that of compressor. The function of the mushroom valves is twofold. When the engine is acting as a motor, the mushroom valves act to cut off the working fluid, and thereby vary the degree of expansion, and their motion is unaffected by the direction of motion of the engines. When the engine is acting as a compressor the positive actuation of the mushroom valves is suspended, and they then act automatically when the pressure in the cylinder rises above that in the reservoir. The suspension of actuation of the mushroom valves is accomplished in convenient manner by mounting the fulcrum of the tappet lever upon an eccentric plug, which is adapted to be rotated, to remove the fulcrum farther away from the valve stems, whereby the motive or effective stroke of the tappet is decreased from maximum, when the valves are fixed open, to zero, when the tappet in its movement misses the valve stems.

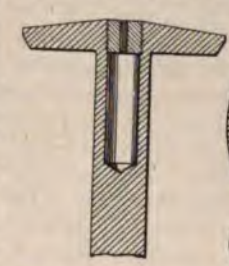


No. 721,899.

The operating mechanism for the variable cut-off and reversing motions are brought under the control of a single lever. This may be effected in the following manner: The operating handle actuates a shaft *w*, restricted to about three-quarters of a revolution. This shaft actuates the reversing motion through the medium of a crank and a sliding block, sliding on a lever or rod so arranged that the whole of the reversing motion occupies the central portion of the motion of the hand lever, the remainder of the motion in either direction being employed to bring the tappet to bear upon the mushroom valves and thereby increase the supply of working fluid.

722,544. Combined Exhaust Valve and Igniter.—Joseph Tracy, of New York, N. Y. March 10, 1903. Filed October 21, 1902.

The exhaust valve stem is drilled into from the top and the opening closed by a



No. 722,544.

No. 722,600.

threaded plug which has a fine perforation through it. The exhaust valve becomes red hot and the ignition is effected on the principle of the hot tube.

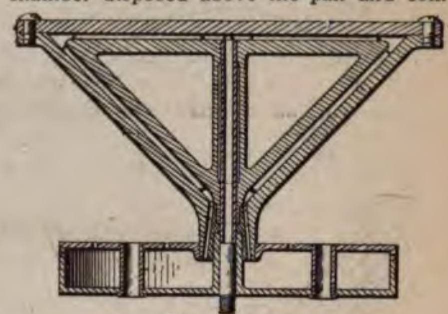
722,600. Pneumatic Tire.—Edwin Midgley, of London, England. March 10, 1903. Filed May 9, 1902.

A strip of chain mail or canvas is embedded in the tread portion of the cover in such manner that the chain mail is covered by rubber on both sides.

By this means complete protection is given to the inner tube from any cutting or puncturing of the outer cover in its contact with the road. The chain mail, while being firmly embedded in the india rubber, is laid in a loose fashion—that is to say, it is not stretched—so that each link or ring will be practically free of its neighbor. This looseness will allow of the cover giving and being sharply indented due to passage over sharp or pointed stones, and insure perfect resiliency of the tire. The links or rings forming the mail being free of each other, any such indentation of the cover will not disturb the position of the many rings embedded in the india rubber.

722,202. Hydrocarbon Burner.—Joseph G. Branch, of St. Louis, Mo. March 10, 1903. Filed January 6, 1902.

The burner is designed for using crude oil and comprises a pan and a vaporizing chamber disposed above the pan and com-



No. 722,202.

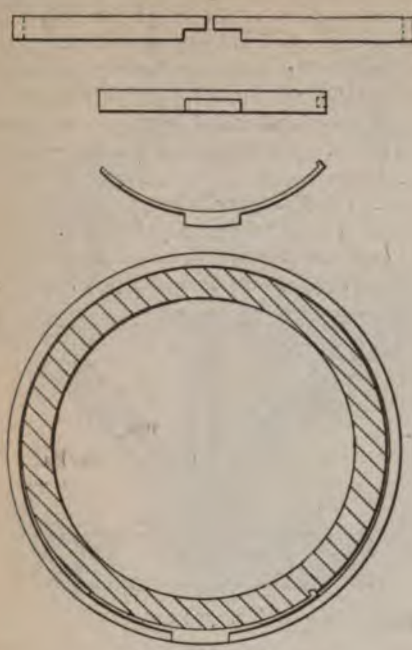
municating at its lower end with the latter, the arrangement being such that the oil in its passage from the supply reservoir to the point of ignition is caused to pass over a large heating surface, whereby it is rapidly and thoroughly vaporized.

The oil is supplied to the burner through the central pipe and from this spreads over the top of the core and down between the inclined face of the latter and the inner surface of the surrounding shell or casing, and from there passes into the pan through the ducts, and the gas escapes through jet openings. In practice the jet openings are made approximately about one-fourth of an inch in diameter, which is sufficient to allow a match, or a piece of lighted cotton wicking, to be inserted through the jet openings to start the burner. It is preferable, however, to lay cotton wicking on top of the pan and allow it to generate heat sufficient to vaporize the oil, which passes through the burner into the pan and burns through the jet openings in the latter. The flames are directed against the exterior of the shell or casing and highly heat the outer casing and its inclosed core.

722,459. Tire for Vehicles.—Oscar Schaefer, of London, England. March 10, 1903. Filed November 19, 1901.

Layers of unvulcanized rubber compound are placed on a circular mandrel alternately with layers of braidings, which are

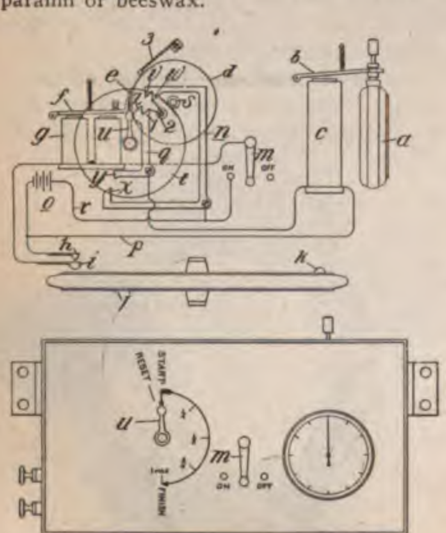
No. 722,459.



No. 722,440.

braided on by a suitable braiding machine. The tire is gradually built up on the mandrel by means of circular layers of unvulcanized rubber alternating circular braidings, so that the tire can be made ready for vulcanization without being taken off the braiding machine. The unfinished tire thus formed is then completed by applying an outer covering layer of unvulcanized rubber of any desired thickness and then placing the whole in a mold and vulcanizing the outer covering layer, together with the layers of rubber of the various turns of the tube, into a homogeneous mass. After vulcanization the mandrel is removed by cutting the tire open at its inner periphery. The resulting tire consists of two tubular spirals, one of rubber and the other of braided flexible material. The tire thus formed is entirely jointless and internal strains and movements are reduced to a minimum.

To avoid loss of strength of the yarns during vulcanization, the braiding yarns are impregnated with ozocerite, ceresin, paraffin or beeswax.



No. 722,532.

It is best to build up the tires of alternating layers of unvulcanized india rubber and braidings, of which the inner braidings are closer together than the outer ones; but in some cases it may be desirable to use closely woven material for the inner layer or layers immediately surrounding the air tube and to braid only the outer layers which hold the thicker tread to the pneumatic proper, as this tread has to bear the principal driving strains. The meshes in the braidings immediately surrounding the air tube will be made smaller than the meshes in the braidings which are nearer to the outer circumference of the tire. In any case the india rubber, which is placed on both sides of the braidings, will unite through the meshes, so that after vulcanization the braidings and india rubber will be solidly baked together into one inseparable mass, which is almost if not quite as elastic as if there were no layers of textile material at all embedded in the tire.

722,440. Piston Ring.—W. G. Wilson, of Westminster, England. March 10, 1903. Filed June 23, 1902.

The ring is made split, somewhat in the usual manner, and at each of the adjoining ends of the ring formed by the split reecesses are made, in which recesses is arranged a tongue so fashioned as to conform with the general contour of the ring. The tongue has in one therewith a spring, which is suitably made flat as wide as the ring in the vicinity of the tongue and adapted to force the tongue outward, and consequently the ring, owing to the ends of the spring bearing on bottom of groove in the piston adapted to receive the piston ring.

By this invention it is impossible for the motive fluid to pass through the split in the ring, because the tongue prevents the passage of the motive fluid to a great extent in the direction of the axis of the piston. Further, the bottom of the tongue being of the full width of the piston ring and in contact with its edges and greater in the circumferential direction than the split in the piston ring, prevents the motive fluid from passing in a direction transverse to the axis of the piston, or, in other words, between the inner periphery of the ring and the bottom of the groove in the piston.

722,532. Speed Indicator for Vehicles.—Alden L. McMurtry, of New York, N. Y. March 10, 1903. Filed October 3, 1902.

The device is designed for use on automobiles and comprises a mechanism wherein a toothed wheel is advanced one step for each revolution of a wheel of the vehicle, and is so related in its movement to the circumference of the vehicle wheel that by the aid of an indicating device associated therewith (in the form of a pointer traveling around a dial) a given distance traversed will be indicated to the view of the occupant of the vehicle, and associated with these devices is a stop watch automatically actuated to indicate the time occupied in traversing this distance and automatically restored to zero. If, for instance, the time is to be taken for a mile, the arrangement is such that at the start the stop watch is thrown into operation and at the finish is arrested, these operations occurring while the pointer is traversing a certain part of the dial—for instance, one-half thereof. The mechanism is operated electrically and the method of operation is as follows: The switch *m* being closed and the vehicle in motion, the wheel *d* will be advanced one tooth each time that the magnet *g* is energized by closure of contacts *h i*, and the pointer *u* will traverse around the dial in the direction indicated by the arrow. When the pointer is at "Start" and the contact projections *w* 1 are bridged by the contact 2, magnets *g* and *c* will both be energized, and the latter attracting its armature lever presses in the spindle or post of the stop watch to start it into operation. As contact 2 passes from contacts *w* and 1 the armature lever *b* will rise under the tension of its spring, carrying with it or assisting the rise of the spindle of the watch, and thereafter the magnet *c* will be inactive until the pointer has reached the division marked "Finish" on the dial, when the contact 2 bridges contacts *x y*, again completing the circuit of magnet *c*, whose armature depresses the spindle of the watch and arrests its movement, the watch then indicating the time during which the pointer has passed from "Start" to "Finish" on the dial, which occurs, as indicated in the drawings, during the time the vehicle has traversed 1 mile. While the pointer is moving from "Finish" to the point on the dial marked "Reset," the watch indicates the time during which the preceding mile was run. When the pointer reaches the point "Reset" contact 2 bridges contacts *v z*, thereby completing the circuit of magnet *c* and causing its armature to depress the spindle of the watch to return it to zero.

722,333. Electric Igniting Device.—Friedrich Sturm, of Stuttgart, Germany. March 10, 1903. Filed January 26, 1901.

Relates to a magneto primary ignition system. The motion of the magneto armature is oscillatory, and in order that when the period of separation of the spark contacts in the cylinder is varied the period of maximum inductive effect in the armature may be equally varied. The pole pieces of the magneto are pivotally supported and are swung around their pivot when the time of the spark is varied.

722,431. Hydrocarbon Motor.—James W. Packard, of Warren, Ohio. March 10, 1903. Filed May 8, 1900.

The invention relates to a gasoline pump for explosive engine intended to pump a charge into the mixing tube at each suction stroke. The effective stroke of the pump is variable.

721,870. Funnel for Filling Storage Battery Cans or Analogous Purposes.—Thomas A. Edison, of Llewellyn Park, N. J. March 3, 1903. Filed November 28, 1902.

THE HORSELESS AGE

...EVERY WEDNESDAY...

Devoted to Motor Interests

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Notice to Advertisers.

Hereafter the first advertising form will be closed on Saturday and the second advertising form on Monday preceding the date of publication. Copy for new advertisements or changes of copy must be in our hands on or before Saturday in order to secure insertion in the succeeding number.

La Turbie Race Ends in Fatal Accident.

One and possibly two more lives have been sacrificed in France to the Moloch speed. In the Nice-La Turbie hill climbing race on April 1 Count Zborowski, the well known New York sportsman, met with instant death, and his professional chauffeur, Baron de Pallange, received injuries which may prove fatal.

The Nice-La Turbie hill climbing race is an annual event and one of the series often referred to as the Nice week. The scene of the race is the cliff road from the outskirts of Nice to the heights of La Turbie, which contains many dangerous turns and sharp ascents. It is not the first time a fatal accident has occurred in these races. In April, 1900, Wilhelm Bauer, driver of a Daimler car of the "White Ghost" type, lost his life at the identical place where Zborowski met his fate, and a commemorative tablet had been erected there to the ill starred chauffeur. The scene of the accident is a sharp turn in the road at a part of the route known as the Corniche road. At this point the road is bounded at its outer edge by a high stone wall. Zborowski, who drove a 60 horse power Mercedes car, was the fifth to start up the long ascent. When he reached the dangerous turn his car, which was going at a very high speed, overturned and the two occupants were thrown out. Zborowski was projected against the stone wall to instant death, while his chauffeur was thrown in another direction and received dangerous if not fatal injuries.

As an indication of the speed at which the car was probably traveling at the time of the accident, it may be stated that the whole distance, which is about 10 miles long, was last year covered in a fog in less than 17 minutes, and with his more powerful machine and with a clear atmosphere Zborowski naturally expected to beat this record. The whole distance is a succession of up grades, and at the points of minimum grade speeds much above the average are attained.

After the first accident at this place the fault was ascribed to the car; it was said to be too heavy to be controllable at high speeds. The car used in the present case was presumably within the weight limit of one metric ton. Various explanations of the accident have been offered, among others that Zborowski was not very familiar with the car, having had it in his possession only a short time. According to one account the car struck a small rock on the road, which caused it to swerve out of its path. The fundamental cause was undoubtedly too high speed for so dangerous a road. The turn at this point is now referred to by one automobilist as a veritable death trap. It is a most deplorable fact that it was recognized as such only after these fatalities had occurred.

Here is a condition that is too often lost sight of in connection with the growing dangers of automobile races—that the roads remain the same while the racing machines are made faster and more powerful every year. Although the race was stopped immediately upon the accident to Zborowski, there was another serious accident at another part of the route the same day. One of the competing cars overturned against the rocks and the occupants were thrown out and seriously injured.

One cannot help wondering in this con-

nection how many death traps there are on the route of the Paris-Madrid race and in the circuit of the Gordon Bennett Cup race. The French Government is restricting automobile road racing more and more, and it will probably not be long before it will be entirely suppressed—particularly if it continues to result in fatal accidents. And the sooner the road race becomes a thing of the past the better it will be for the industry.

The Latest About the Edison Battery.

The long delay in the appearance upon the market of the widely heralded Edison storage battery has given many persons an impression that in the development of the invention Mr. Edison ran up against some "snags." What the difficulties met with have been has so far remained dark, but some recent utterances of the inventor and a number of recently issued patents (described in detail in this issue) throw some light on this subject.

In the .t place, the nominal capacity has been reduced from that given in the first description of the new cell by Dr. Kennelly before the American Institute of Electrical Engineers about two years ago, and with the present rating the Edison battery is hardly equal to the best lead batteries as regards specific capacity. As the amount of energy which a certain quantity of the active material is capable of storing is invariable, it must be inferred that it was found expedient to reduce the proportion of active material to the total weight of the cell. This inference is confirmed by one of the patents referred to, in which it is stated that the oxidizable element of the cell swells considerably during the process of charging, resulting in the bulging out of the walls of the sheet steel pockets which retain the active material. This necessitated a greater space between adjacent plates, which space had to be filled with electrolyte, thus adding to the weight. Possibly the same action necessitated heavier retaining walls. The present invention aims to overcome this difficulty, but it evidently accomplishes the object only in part, for, although it may not be necessary to space the plates as widely with concave pocket walls as with straight walls, the concave walled pockets will hold less active material, which would seem to reduce the capacity.

The subject of the other patent is a new admixture of conducting material for the active material. Originally fine flake graphite was used for this purpose. It is now proposed to mix the finely divided iron with mercury and copper, which is claimed to have the same effect on the conductivity of the active material as the graphite, and in addition keeps up the voltage toward the end of the discharge.

Auto Laws and the Motor Bicyclist.

The average bill to regulate automobile traffic upon the highways starts out by premising its scope as including "automobiles, locomobiles, motor cycles and other motor vehicles, etc." One frequently cannot help thinking, however, that in the further elaboration of these bills some of the classes of vehicles included have been lost sight of. This applies to the recently adopted New Jersey law among others. The first section of this law reads:

"Whenever the term 'motor vehicle' is used in this act it shall be construed to include automobiles, locomobiles and all other vehicles propelled otherwise than by muscular power, excepting the cars of electric and steam railways and other motor vehicles running only upon rails or tracks; but nothing in this act contained shall be construed to apply to or affect bicycles, tricycles or such other vehicles as are propelled exclusively by muscular pedal power."

This paragraph leaves no doubt that the provisions of the law apply to motor bicycles as well as to automobiles, and hence motor bicyclists in New Jersey will in future have to comply with the following requirements: Specify the character of their vehicle and make application to the Secretary of State for a license, against payment of a license fee of $1; display their license number in characters at least 3 inches high upon the rear of the machine; carry at night two white lights visible at least 200 feet ahead and a red light visible from behind; display the license number on each of the white lights, etc.

Some of the requirements, notably that of three lights, are unreasonable, to say the least, and bound to hurt motor cycling if enforced. The passage of these requirements can only be explained on the assumption that the inclusion of motor bicycles in the scope of the bill was entirely lost sight of. Few of the automobile clubs represent any motor bicycle interests, and it devolves upon the special motor cycle organizations to keep track of the trend of legislation affecting these machines. We hardly expect the provision requiring the machines to carry three lights will be enforced, but it is nevertheless objectionable to have such a law upon the statute books.

A Point in Twin Cylinder Design.

In examining sectional drawings of twin cylinder gasoline engines it is found that some designers allow only a single wall between the cylinders, while others provide a wall for each cylinder, with a water space between the two walls. No doubt every designer of twin cylinders thoroughly considers the question of the possible effect of alternate heating and cooling of opposite sides on a single wall. If there is no danger of distorting a single wall owing to the great difference in temperature on its opposite sides at any given moment, and no danger of overheating the wall, which is subjected to the temperature of explosions with its two sides alternately, and thus impairing lubrication, the single wall certainly has the advantage over the double wall. Weight is saved both in the cylinder casting and in the crank case casting, and in a two cylinder engine with double throw crank the closer the cylinders are brought together the better is the balance of the reciprocating parts. At present the majority of motors seem to be built with a water space between the cylinders, although the other design is not uncommon. A discussion of the merits of these alternate forms of construction by engineers who have had experience with either or both should prove timely and interesting.

The Era of Organization

The spirit of organization seems to have overtaken the automobile business of late, for we now have, in addition to automobile and motor cycle clubs, a general manufacturers' association, an association of gasoline automobile manufacturers, local dealers' associations and an association of professional drivers. As the number of individuals engaged in any particular line of business increases, questions or problems of common interest arise, and often call for united action. Such problems are, of course, most readily dealt with by a permanent organization, and it is gratifying to note that, wherever the need of such organization has become manifest, the parties concerned have always gotten together and agreed upon articles of association with little or no friction. In this respect the history of the industry in this country compares most favorably with that of the in-

uropean countries, particularly

proposed organization is that
ile dealers and storage station
he city of New York. The ob-
emedy a number of evils which
ly been shown to exist in the
regulate the chauffeur ques-
attempt to centralize the stores
ries of the automobile trade, so
pective purchaser, intending to
per of agencies, need not travel
city, as at present. A tem-
nization was effected at a meet-
7 East Forty-second street last
e organization was to be made
t a meeting last night.

ble Throw Transmission Again.

York *Herald* of Sunday, April
a lengthy description of a new
nitting apparatus for automo-
"may revolutionize the motor
The device is of the variable
and is the invention of a Mr.
nith, who has been connected
nical traction for ten years, we
A model of the apparatus was
a shop at Levallois Perret,
and the description originally
the Paris edition of the *Herald*,
ngs accompanying the descrip-
n ordinary four cylinder ver-
, the crank shaft of which is
evel pinions to a crank shaft at
to it, provided with a movable
From this crank pin the power
ed to the differential on the
by means of a pair of connec-
which engage with the outer
isk on the differential gear by
centric gripping devices.
familiar with the history of au-
ention it will be apparent from
ion that Mr. Meischke-Smith's
at all new as far as its general
concerned. In fact, so many
e been issued by the United
nt Office for variable throw
s for automobiles that the *Her-*
scribe one of these inventions
nday issue for several years to
would give American inventors
w as foreigners. If the device
s any merit over others of the
t must depend upon its details,
ever, the drawings show to be
conceived. The variation of throw is effected by means of brake bands acting on two gear drums, the teeth of which are in mesh with the teeth of a pinion operating the worm which moves the crank pin. When the car is going at full speed in one direction, the only way to disconnect the motor from it is to move the crank pin from the extreme outward to the central position, which, with the slow worm motion, will consume a considerable time. The eccentric clutch or ratchet device also appears of rather primitive design. At any rate, the transmission of motion from engine shaft to countershaft cannot possibly be uniform, which is a very serious drawback.

The Meischke-Smith invention is one of that large class which do away with certain parts of the mechanism (in this case the change gears) of a motor car, but which fail to substitute an equally satisfactory device. It appears that this class of invention appeals most to the reporters of daily papers, who are themselves incompetent to form an opinion as to either the novelty or practicability of the device, and have to go largely by the claims of the inventors, which are, as a rule, the more pretentious the more impracticable the invention.

Calendar of Automobile Dates and Events.

April 11.—Eliminating Contest for Gordon Bennett Cup Race.
April 24.—Quarterly 100 Miles Trial of the A. C. G. B. and I.
May 10.—Motor Cycle Century Run.
May 13—14.—Non-Stop Run of the Scottish Auto Club, Glasgow to London.
May 14.—Start of Paris-Madrid Tourist Section.
May 20—21.—Commercial Vehicle Contest under the auspices of the Automobile Club of America.
May 24—26.—Paris-Madrid Race.
June 18—20.—Paris Automobile Fetes.
July 2.—Gordon Bennett Cup Race.

British Gasoline Motor Design.

By T. Hyler White.

British gasoline automobiles may be roughly grouped into three classes—single, double and four cylinder engines. Single cylinder motors range from 3½ horse power up to 8 horse power; double cylinder from 10 horse power to 20 horse power and four cylinder from 16 horse power upward. Some two or three makers are using three cylinder motors, such as Brooke & Co. and the Maudslay Motor Company, and it is quite probable that other firms will follow this lead in the near future. Mechanically operated inlet valves have not as yet made much progress in England, the majority of makers contenting themselves and their customers with automatic inlet valves. The Maudslay motor has cam controlled inlet valves, and the result is very satisfactory. On the other hand, the Napier cars have engines with plain suction valves, but of the three ported variety, and from statements recently published there seems little prospect of any change being made in this part of their design.

Governing is now almost always accomplished by throttling the charge before it enters the cylinders. The hit and miss exhaust governor is quite out of date. Usually the governor can be adjusted for speed by a lever within easy reach of the driver. In some cases this acts on the governor spring to increase its resistance or the reverse, and in others it acts directly on the throttle valve without reference to the governor connections. There are instances where the governor also acts to control the moment of ignition, but they are rare.

Ignition is almost universally by high tension jump spark, a coil and accumulator being used. Low tension magneto machines are in use to a limited extent, these having a make and break device inside the combustion chamber. A notable example of this method is the Simms motor. The low tension self induction coil, with contact breaker inside the cylinder, is not used at all. In all cases means are provided by

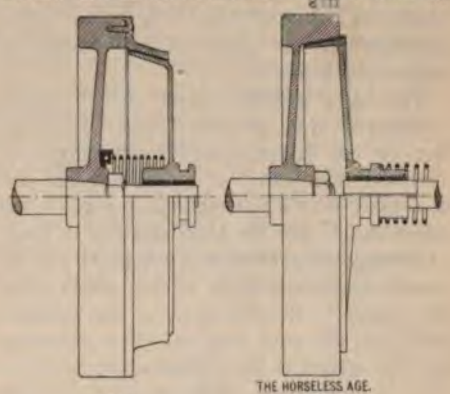


Fig. 1. Fig. 2.

which the time of ignition can be easily varied by the operator, a small lever on the steering column being the usual arrangement.

Carburetors are usually an adaptation of the Maybach float feed spray type. In some designs a needle valve adapted to be lifted from its seat by the suction of the motor acting on an air valve, on the same spindle as the gasoline valve, is used with a fair amount of success. The tendency is to retain the float feed jet carburetor, but with an arrangement to allow extra air to be automatically drawn in as the speed of the motor increases. It has been found that as the speed of the air passing through the carburetor increases there is a tendency for too much gasoline to be sprayed from the jet, hence the need of the auxiliary air inlets.

Simple spring controlled, leather covered, conical friction clutches are a feature of most designs. Most of them are arranged so that there shall be no end thrust on the shafts when they are in engagement, but a

good many of them neglect this precaution when the clutch is out of engagement. A form of clutch much in favor is that shown in Fig. 1, but a good many makers adopt the type Fig. 2. In the former pattern the thrust is self contained when in gear, whereas the other (Fig. 2) requires a separate thrust bearing.

Coming to the transmission of power from the clutch to the road wheels, on cars up to 3½ or 4 horse power two forward speeds are generally thought to be enough. Sometimes a reverse is added. From 4 to 8 horse power, three speeds forward and a reverse appear to be the rule, while above 8 horse power four speeds and a reverse are usual. Designers differ as to the method of transmitting the power from the gear to the driving wheels. Cars up to 8 horse power and even 12 horse power are fitted with a jointed shaft and bevel gears driving a balance geared, live axle. Generally speaking, 8 horse power would seem to be the limit for this method of driving. For higher powers a countershaft, with the differential gear located thereon, drives each of the rear wheels with a chain, outside the frame and springs, a sprocket pinion being attached to each end of the countershaft, and a sprocket wheel to each of the rear wheels, which in this case run freely on a solid axle. Ball and roller bearings are not much in use except on quite light machines.

The speed gear is nearly always of the "Panhard" type, in which either the driving, or the driven, gears are arranged to slide on their shaft and thus engage, one at a time, with a corresponding gear on the other shaft. On the high speed it is usual to arrange matters so that the gears are inoperative and the drive is then direct from the engine to the live axle, or the countershaft, as the case may be. For reversing an idler pinion is the method most in favor. This is introduced, when required, between a pair of extra wheels, and thus they are caused to make the two shafts in the gear box revolve in the same direction instead of opposite ways, as when going forward. When a countershaft is used it is driven by bevel gears and the reverse is obtained by bringing one or other of two bevel wheels into gear with the same pinion.

As the law compels every motor vehicle used in the British Isles to have two independent brakes, a good deal of attention has been given to this point. The majority of cars have a foot operated brake and one worked by hand. The former takes the form of a band brake, which is located, as a rule, either on the countershaft or on some part of the jointed driving shaft. In either case this brake must act through the balance gear. The hand brake consists of a band brake on each of the back wheel hubs, the practice of using shoe brakes acting on the tires having been abandoned long since. The Wolseley car has a shoe acting on the inner surface of a rim, or drum, on each of the driving wheels, this drum being only about 3 inches above the road surface. Attention has recently been turned toward making band brakes equally effective whichever direction the drum may be revolving. To this end some firms are making the brakes somewhat after the style of a friction clutch—i. e., expanding the band inside the drums.

The use of artillery wooden wheels is becoming more common, only the smallest and lightest machines being now made with wire spoked, cycle type wheels. Pneumatic tires are much in evidence, but signs are not wanting to show that solid rubber is coming into favor; at least for touring cars pneumatics are a necessity for fast driving and racing.

Running gears are always of the reachless type, except for heavy wagon and truck work. Channel steel, wood with steel flitch plates, seamless steel tube and pressed steel are all in use for underframes. A special hydraulic plant is being installed by Rubery & Co., Darlaston, Staffordshire, for the economical production of pressed steel frames, so that it is by no means unlikely that this will be adopted as a standard by the majority of makers for all sizes of cars. In a few cases the engine and speed gear box are bolted directly onto the main underframe, but the majority of designs employ a separate frame, slung below the main frame, to carry the engine and gear. Both front and back axles are attached by springs directly to the main frame and radius rods to control the movements of the driving axle are usual. The body is also bolted to the frame and in many designs there is provision for changing the body without interfering with the working parts of the car.

The steering arrangements are nearly always of the inclined pillar and hand wheel style. The side lever is not in use at all. Some kind of gearing, either worm, bevel or rack and pinion, is employed to give the driver a mechanical advantage over the steering wheels. Worm gear is nearly always used on cars of 8 horse power and upwards, and is made non-reversible.

Of minor points the placing of the ignition commutator on the dash, in full view of the driver; the use of the external spark gap in series with the spark plug; wipe contacts on the commutator with a trembler on the coil; longer wheel base and longer springs to the axles; and double acting band brakes are all being gradually incorporated into the better class of cars.

Up to the time of writing there is no British car on the market with a two cycle engine, all being fitted with Otto cycle motors. In fact, with the exception of American launch motors, the two cycle engine is an unexplored field in England.

There is a big demand for a reliable car, to seat two, of say 5 horse power, two speeds and reverse, to sell retail at from $500 to $600. It must be a car, not a seat on wheels, and should have artillery wheels, shod with solid rubber tires. It is quite on the cards that such a machine will be forthcoming before long; several concerns are actively engaged in experimenting with a view to producing it.

Notes on Piston Valves.

In the course of a paper on this subject F. A. Houghton, the author, calls attention to some peculiarities inherent to certain types, and especially to that of the solid design with internal admission. The following types are to be found on simple engines: (1) The solid form, with external admission and internal exhaust; (2) the hollow form, with internal admission and external exhaust; (3) the solid form, with internal admission and external exhaust.

The first (solid external admission) has very much the same action as the slide valve, but some designers object to it, because it requires the live steam passage in the saddle to be divided with a separate branch leading to each end of the valve chamber, thereby bringing the live steam in contact with the more exposed parts of the cylinder with resulting condensation.

The second (hollow admission) has the internal admission and exhausts at the ends, but has in addition a hollow centre which permits the exhaust at either end to circulate freely and instantly from one end to the other. It is objected to by some designers on the ground that the live steam is jacketed with the cooler exhaust steam in the hollow centre of the valve, resulting in condensation.

The third (solid internal admission) also has the internal admission, but is without the hollow centre, thereby preventing the exhaust at either end from circulating back and forth except in the roundabout way through the cylinder saddle, and back to the opposite end of the valve chamber. This takes some time to do, and, therefore, causes an unequal pressure on the opposite ends of the valve, which is greatest with the following combined conditions: Slow speed, full throttle, maximum cut-off, and at the moment exhaust opening occurs. The extent of this unbalanced pressure does not seem to be generally appreciated. It is applied very suddenly and acts on the end of the valve in the same direction in which it is moving, and takes up all the lost motion in valve gear from the valve to the eccentrics with a sudden shock, the extent of which depends on the degree of lost motion, but which is apparent on any engine equipped with this form of piston valve.

New Plate Metal for Automobile Bodies.

F. Hiorth, Christiania, Norway, sends us a sample piece of a new white metal with a specific gravity of 3, made in angle, channel and I sections and in plates for automobile bodies, etc. It is claimed to have a tensile strength of 37 kilograms per square millimetre (about 53,000 pounds per square inch), the same as ordinary wrought iron and an elongation of 12 per cent.

BEGINNERS
PAGE.

The Electric Motor.

(Concluded.)

BRUSHES AND BRUSHHOLDERS.

current by which the motor is is led into the armature through nmutator, by means of rectangular of gas carbon or graphite, bearing surface of the commutator. These of carbon or graphite, referred to mmutator brushes," are held in olders, and are pressed against the tator by means of springs. The olders are pivotally supported on extending parallel with the com- and clamped to the casing of the e, but insulated therefrom. Fig. 1 one form of brushholder. In this A is the carbon brush and B the The latter consists of a rectangu- sing through which the brush fits. ush is clamped in the holder by of the set screw C and a sheet late against which the point of the w bears. The brushholder is pro- vith two arms D D by which it is y supported on the brushholder To the brushholder stud between is D is secured by means of a set spring bracket F, and the back of shholder is provided with a similar G. A coiled spring H is con- between these two brackets, which the brush against the commutator. ring tension can be adjusted by the spring bracket F around the lder stud. With this form of brush- as the brush wears the holder angularly about the brushholder d this somewhat changes the lines act of the brush on the commuta- o avoid this the brushholders are nes made stationary and the caused to slide in them under the of springs. This latter type of lder is known as the parallel feed d presents the further advantage does away with the set screw to e brush in the holder.

ASSEMBLING THE ARMATURE.

the core has been assembled the g troughs of mica are placed in s and insulating material is ap- the ends of the core and the Then the coils are put in place in s and are connected up to the ator segments by being soldered ts in the lugs on these segments. r to securely hold the coils in the d prevent them from flying out e armature is in motion, bands of rass wire are wound over the core ayer of mica, the ends of the bands cured by soldering and by means brass clips.

2 shows a longitudinal section through an electric motor assembled. A A is the field magnet and B B are two of the field coils. C is the armature shaft which is supported in the end plates or bearing plates D and E which are bolted to the field frame and form with the latter the casing of the motor. The bearings are bushed with bronze or babbitt metal and are provided with an oil well below them. Rings F F hanging from the shaft down into the oil wells carry the oil onto the shaft as they revolve when the armature is in motion. It is essential that no oil gets into the motor, as it will rot the cotton insulation of the wire and also prevent the brushes from making good contact with the commutator segments, and for this reason a return is provided for the oil from the inside end of the bearings to the well. The shaft, or a piece forced over the shaft, is turned with a sharp ridge G which flings the oil off by centrifugal action when it reaches there. The oil is thrown against the surface of a circular groove in the bearing hub, flows by gravity to the bottom of that groove, and from there through an inclined drill hole back to the well. A groove and return passage to the well are frequently also provided at the outer ends of the bearings.

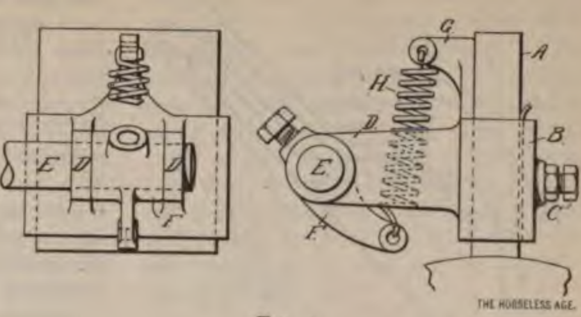


FIG. 1.

The commutator H is keyed to the armature shaft against a shoulder on the latter, and the ends of the coils I I are soldered into the lugs of the commutator segments. J represents the brushholder and K the brushholder stud, the latter being clamped into the end plate with insulating (hard fibre) washings and bushings. The angular position of the brushholders must be adjusted very accurately or there is liable to be very destructive sparking at the brushes under certain conditions of load. The brushes usually are of the width of two segments. When the brushes are set so that the coils connected to the segments under them are located midway between poles they are said to be in the neutral position. The brushes of an automobile motor must be set slightly back of the neutral position—i. e., slightly away from it in the direction opposite to the direction of armature motion. As a rule the brushholders are fixed in position at the factory and never need any angular adjustment at the hands of the user.

The brushes and commutator are the most delicate part of an electric motor and need occasional inspection, and to facilitate such inspection a door L is usually placed on the commutator end plate right over the brushholders. When the commutator has become gummed it must be cleaned with fine sandpaper, and as the

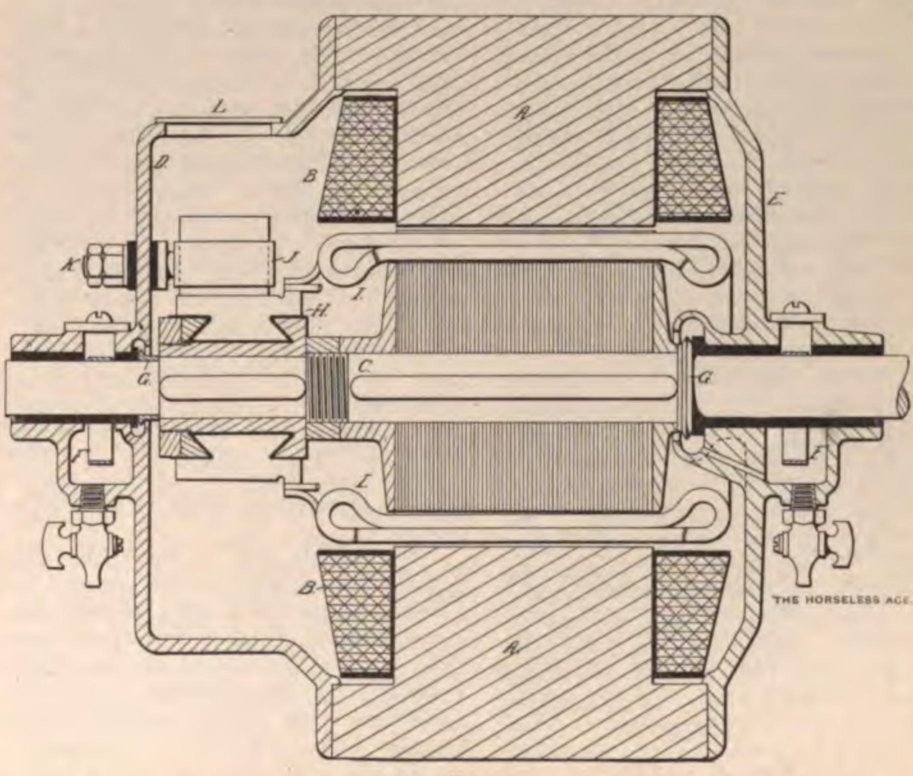


FIG. 2.

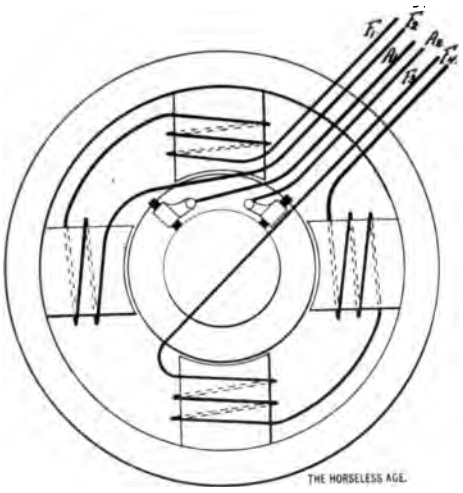
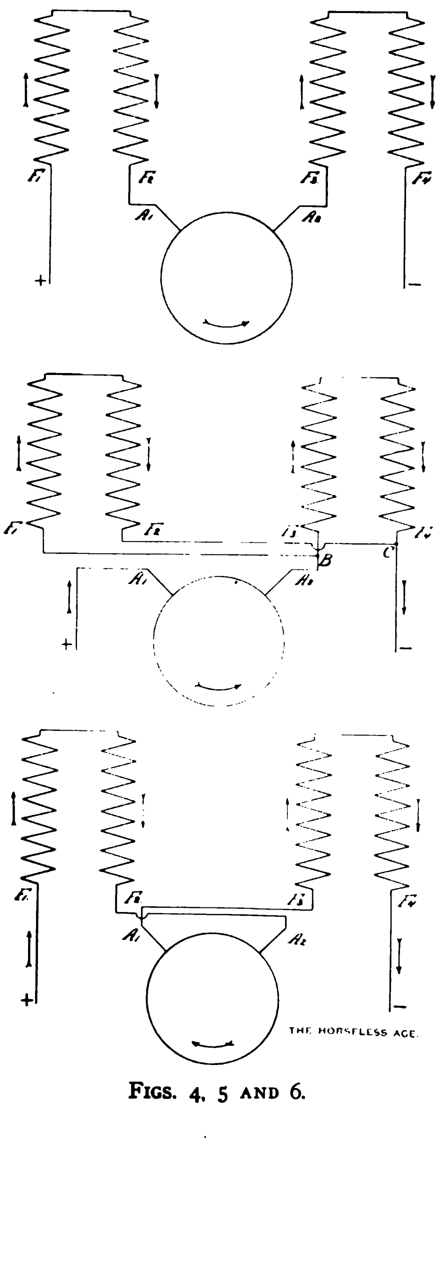


FIG. 3.

brushes wear they must be adjusted periodically and finally renewed. The carbon dust from the brushes must also be cleaned out periodically, as it is liable to cause short circuits.

CLASSIFICATION OF MOTORS.

Electric motors are divided into series, shunt and compound motors. In a series motor the same current flows through the



FIGS. 4, 5 AND 6.

field and armature windings in succession. In a shunt motor a small portion of the main current is branched off and flows through the field winding, and the rest through the armature. The field coils of a series motor are wound with large wire, while those of a shunt motor are wound with fine wire. Compound motors have double sets of field coils, one set of heavy wire, which is connected in series with the armature, and one set of fine wire, which is shunted across the armature.

The characteristics of the series motor are the following: It can be started without special starting resistances; when running at light load it runs very fast, and the speed decreases rapidly when the load is increased. The maximum torque is produced in starting or when the motor is at a standstill. The chief characteristic of the shunt motor is that it runs at practically constant speed for all loads up to the normal. When driven above this speed, as may happen in going downhill, the motor automatically changes to a generator and sends a charging current back into the storage battery. For motors of the same size or power a series motor develops more starting torque than a shunt motor, and for this reason series motors are almost exclusively used on automobiles.

SPEED CONTROL OF ELECTRIC MOTORS.

The speed of a series motor varies with the torque, as has already been explained. While the torque remains constant, the speed may be varied: (1) by varying the electro-motive force applied to the motor; (2) by varying the strength of the magnetic field. The speed varies almost in direct proportion to the E. M. F. at the terminals of the motor; it varies inversely with the strength of the field, although not in the same proportion.

Electric motors are permanently geared to the driving wheels of the cars and the speed control of the cars is effected entirely by varying the speed of the motors. The usual method of control is to vary the electro-motive force by connecting the cells of the storage battery first all in series and then in two parallel rows, thus halving the E. M. F.; and to vary the field strength by connecting the four field coils either all in series or two in series and two in parallel. All these changes in connection are made by means of a controller or multiple switch. To reverse an electric motor all that is necessary is to reverse the current through the armature, while the curent through the field remains the same. This is accomplished by means of another multiple switch or reversing switch, to be described later.

The sketch Fig. 3 shows the usual method of bringing out the armature and field connectors in a four pole series automobile motor. These connectors, six in number, are heavily insulated stranded flexible cables which pass through hard rubber bushings in the wall of the motor casing. It will be noticed that two adjacent field coils are connected together in such a manner that when looked at from t mature the current must flow in (them right handedly and in the oth(left handedly, thus making of one : north pole and of the other a south The two free ends of these coils ar ried out of the casing, and the oth(coils are connected up and their fre carried out in the same way. Of t cables leading out of the motor four are therefore field connector F_2, F_3 and F_4) and two armature c(tors (A_1 and A_2). In case the motor is entirely controlled by varying tl plied E. M. F., and no changes in tl connections are made while runni the field coils are directly connec each other and only two field con are brought out of the motor case.

Three of the possible connectio represented by Figs. 4, 5 and 6 resp ly. Of these connections those of 4 and 5 give give rotation in the sa rection, which may be assumed to l corresponding to forward motion car. The connection of Fig. 6 gives ward motion. The direction of c flow in armature and field coils i: cated by arrows, and it will be see in the field the current always flows same direction, while in the armatu reversed (Fig. 6) to obtain backwa tion. With the connection shown i 4 the current flows first through o of field coils, then through the ar and then through the other pair c coils. With the connection of Fig. current flows first through the ar divides at the point B, and one-hal flows through each pair of field coi two currents uniting again at the p(In this manner only one-half the tot rent flows in each of the field coil: the result that the magnetic field is ened and the motor runs faster. Th nection shown in Fig. 6 is the same : in Fig. 4, except that the armature nals are reversed. The current th(flows through the armature in the o direction to that in which it flowed i 4, and this causes the armature to t the opposite direction.

A New Garage System.

Many a manager of a garage h deavored to establish and carry out tem that would simplify the busine protect the interests of his patrons, b systems have been found satisfacto is difficult to overcome the cunning designing chauffeur, who will, when (tunity affords, take his employer's a bile out of the station and use it l own pleasure or for hire. At the l Storage and Repair Company's ga Fifty-fourth street and Broadway, York, an original system is in use is claimed to cover all points satisfa

When a wagon is taken there for : the usual arrangements are made time, and it is allotted space at so ı

foot and not at so much per car. is numbered and entered in a book r that purpose. The next step is to ie owner fill out a blank form of ns showing who may take it from tion, who may fill the tanks, order etc. The answers guide the man- t while the car is under their charge. ve parts are tagged as soon as dis- l, and a card of notice is sent to the at once. In this way it is easy at e to tell how often and how long a been out, whether it is in order or d what the exact cost of all repairs n. Tabs are kept on the number s it is charged, the repairs needed me to time are kept on record, and everything that will throw any light question of costs is available to the it any time, so that there need never doubt of the safety and relia- f his car or of the correctness of ills and general storage expenses.

s Strewn with Broken Glass.

itleman who has just returned from ith states that automobiling is next ssible at Charleston, S. C., in con- e of the broken glass which is iere strewn in the streets. It seems a liquor law in South Carolina ing the drinking of intoxicants by on the premises where they are ie negroes, therefore, are compelled their liquors in bottles, which they s soon as they have exhausted the s, leaving the pieces in the streets nace to the automobilist.

y Wagon of the War De- partment.

in C. B. Wheeler, of the Ordnance nent, states that a motor battery is being built for that department vill be finished about July 1. It will n by a 40 horse power, four cylin- losion motor and fitted with solid tires on 54 inch wheels. The track ches. The total weight of the wagon 12,000 pounds and the load capacity 5,000 pounds. A maximum speed niles per hour is figured on. The is intended to be a machine shop els and to replace a horse wagon ed for the same purpose which is y six horses. The use of the motor e several men. The wagon will be anied by a machinist, who will also it, and by a farrier.

'motor car game" is said to be one newest and costliest forms of ent from Paris. The players con- ir motor cars, which are arranged ing pong board or billiard table, ncil like switches. For overthrow- ing the race any of the obstacles along the course a player is fined sum, varying in proportion to the nce of the obstacle.

LESSONS OF THE ROAD

Four Thousand Miles for Revenue Only.

By Pills and Tablets.

To dispense with horses and speed from place to place as with wings had long been a day dream to beguile the tedium of weary drives. So long, in fact, that it became a will o' the wisp ideal. But strange to say, it has come to pass, for as my auto skims over the ground I feel that it is actually a living part of me, yet bearing me as on wings whither I will.

My experience has been limited to seven months only, wholly in the line of business. It has been a very happy disappointment, for I expected an infinite amount of annoyance and increased expense, but the opposite has been realized. It has saved me both time and money and given me an amount of pleasure never before extracted from one small package.

To be sure, I have had perplexities without number, Chinese puzzles, that have repaid the trouble of solving, royal games of chess, but I have invariably won and therefore am content and more than enthusiastic.

TAKES THE MACHINE APART.

Perhaps a résumé of my perplexities may not be without instruction. They began on the arrival of the machine. First I studied the brief and very unsatisfactory instructions forwarded with the car. They might be summed up in a concise manner somewhat as follows: Your machine consists of a generator, burner, bypass, oiler, etc. Run it. If you cannot, send to the nearest agency and we will send you a man at $9 a day and expenses to show you how. All this was depressing and made me wish heartily that I had held tight to my good dollars. After several days of consideration I determined to pull the thing to pieces and discover, if possible, what made the wheels go round. In course of the next week I had taken almost everything apart except the generator and burner. This proved a most valuable experience, for I gained a knowledge of the machine which has constantly served me. After successfully reassembling the parts I stole from my bed very early one morning, fired up and opened the throttle. Half surprised it seemed, purred softly and began to move. With my hair fairly on end and heart beating wildly I steered into the street. Never were streets so narrow as on this morning, never was road so voraciously swallowed up by the machine. I could see nothing but the reeling road and the dancing steam gauge. I ran slowly and the gauge climbed to 350 pounds. I opened the throttle and down it went like an avalanche to 150 pounds. When I went slowly the steam pressure alarmed me and when I went fast the speed alarmed me. But nothing serious really did happen, and I arrived home in due time, exhausted but happy. The amiable temper of the machine on this morning saved it, too, for if it had had a bilious attack such as it has since suffered from I am sure I would have sold it for 30 cents and convinced myself I had made a good trade. After a little, the technic of running was acquired and my car commissioned for daily work.

A HILLY DISTRICT.

The district in which I practice is very hilly. Perhaps some of my readers may know Eastern Connecticut. There are few stretches of over a half mile of less than 4 or 5 per cent. grade and not a few as high as 22 per cent. My residence is about half a mile from my office and the grade is 12 per cent. In whichever direction I go I must make not less than a 12 per cent. grade. It is therefore apparent that my car has been subjected to severe strains, yet during the period from May 1 to December 1 I have used my car for every bit of my professional work except for two days and have traveled a distance of 4,000 miles, and all this with but two stops for adjustment of part of the working machinery.

THE WATER SUPPLY.

One of my most absorbing annoyances arose from the management of the water supply to the so called steam generator. The steam power is developed by a semi-flash boiler, the fire being controlled by a thermostat which operates when the steam pressure is too high or the water too low. This portion of the mechanism was difficult for me to understand. To develop my power a pilot light must first be started, which is operated like a plumber's torch. This heats a vaporizer through which the gasoline must pass to the main burner. The thermostat operates on the supply of gasoline to the vaporizer whenever the thermostat reaches a temperature of 400° Fahr. It is therefore plain that when the steam pressure reaches about 225 pounds the thermostat will stop the flow of gasoline, and contrariwise if the water supply fails exactly the same thing happens. Now, as simple as this appears it was very troublesome at the outset to grasp it in all its relations and led to the expenditure of considerable money and fruitless search for some imaginary abnormality. That others may be spared the ignominy of such stupidity I will recite my experience. On the second day's run I was making a comparatively level road after a rather protracted call when my steam pressure began to fall. Under such conditions my instructor advised me to "run fast." This I would gladly have done, but I lacked the steam. I therefore closed the throttle and inspected my burner. To my chagrin I found it almost out, yet the gasoline supply was fully turned on. It would flame up a little and then go out and seemed to say, as it

winked at me: "Great fun, this running of autos." With remarkable acumen I diagnosed an obstructed gasoline pipe, and having fortunately the grade in my favor succeeded in reaching home. Removing the gasoline feed pipe I found it in order, so I concluded the trouble was in the vaporizer. This was removed and drilled out. Then reassembling the parts I made another start and to my surprise the old condition remained. After some very hard thinking it dawned upon me that the thermostat was the source of the untoward action, and reaching down to my hand pump I injected a quantity of water into the generator, and lo! it was breath to its nostrils. It filled its body with life. The burner roared, the steam pressure rose like a rocket and I sped away. I had had insufficient water and the thermostat had closed, thereby preventing the burning of the generator. The machine was in perfeet operation and my vexation arose from my own ignorance. I soon found this thermostat was a thoroughbred aristocrat, and elbow grease must be applied to the hand pump whenever it gave the signal, and no questions asked. On every steep grade and any long grade the shutting off of the fire called for more water by the way of the hand pump and I meekly responded. But after several weeks the demand became more frequent and I was pumping on even 4 or 5 per cent. grades and, in fact, most of the time. I then went on a strike and did more profound thinking. The fact was that I did not get water enough into the generator. I directed the repairer to reseat all of the valves on the water supply and set the by-pass to open at 220 pounds. In a short time "all ready" was reported, and now, said I, this soul rasping water system is again in perfect order. I started out with buoyant spirits, but soon the burner signaled more water. Well, I pumped and thought the rest of the day and had half concluded that my generator was afflicted with dypsomania, when it occurred to me it might be wise to determine for myself if the by-pass opened at a steam pressure of 220 pounds. A few minutes well spent proved beyond cavil "What fools these mortals be." The by-pass opened at 160 pounds pressure, and since I had tried to continually maintain the orthodox 200 pounds pressure I was obtaining only a scant supply of water. By readjusting the by-pass I stopped this annoyance—a monument to carelessness, ignorance and stupidity. Another annoyance arose from the rapid

EROSION OF THE THROTTLE VALVE.

so that it would leak steam when the car was not running, thereby filling the cylinders with water if the stop was long. If not reground often the car would stop only on applying the brake or placing the reversing lever on the centre. After grinding the valve a few times I had an auxiliary throttle of the compression type put in. Since then I have not reground the working throttle.

The only time my car has been out of commission during the seven months arose from the breaking of the cast iron throttle valve while removing it for regrinding. This accident compelled me to deliver to the repair men $8 for a new one, an article barely worth $3 in an open market. The throttle annoyance is a very black mark against the maker. One morning after a month or two I heard

A GRATING IN THE HUB

of the hind wheels on reversing the speed. Examination failed to sustain that deduction, but disclosed the working of the wheels on the axle. This was remedied by inserting new and larger keys. The relief was, however, only temporary and I have since found it necessary to readjust them. In this annoyance the fault is the makers, the construction being slipshod and unskillful. A conical axle, wider bearings on the wheel hub and deeper slotting for the keys would provide for the taking up of the wear or compression of the brass hub. The construction of

THE BRAKE DRUM

is also bad, causing considerable annoyance. On my machine a brass drum is secured to the differential by inserting lipped projections into babbitt metal. The natural sequence is that it soon becomes loose and rattles viciously. After readjusting it once I abandoned all effort to keep it tight and aimed simply at stopping the rattle. This was accomplished by forcing several chunks of rubber between the drum and the differential, an annoyance entirely due to bad construction. Another annoyance arose from a leak in the gasoline tank, the band in the middle which unites the two sections being insufficiently soldered. While the resoldering was a small matter it consumed four hours to remove and replace the tank. Here again bad workmanship was the source of the annoyance.

STEERING GEAR JOINTS.

Very marked improvement is needed in the construction of the joints of the steering gear. Constant motion soon wears them, and an annoying rattle results, a contingency evidently not foreseen by the maker. To correct this evil I have made bushings of copper, thin sheet metal being cut and rolled to size. When the wear is inconsiderable I insert rubber disks under the metal washer, compressing with the cotter pin.

TWO ADJUSTMENTS ON THE ROAD.

On the road I have left the seat but twice to adjust any part of the working machinery. Once the chain jumped the sprocket and later a cup on a piston rod worked loose and dropped down. Both were avoidable, and due to carelessness. The chain had been running loose for a day or two, and not realizing the advisability of maintaining a moderately tight chain I neglected to adjust it. A pair of very dirty hands was sufficient punis and I now keep it well tightened. other instance I had repacked the s boxes on the previous day, purposel ing the caps loose until I had run a and had forgotten them. I had by n a very interesting young lady. Sl just recounted the difficulties of a and I had said with some pride that been delayed but once on the road suddenly a clatter, clatter, clatter s beneath our seat. Stopping at c helped my companion to dismoun stripping the carriage of seat and located and corrected the humiliatin In my experience no part of the n should be more carefully watched th chain, and special attention give coupling link. My first lesson parti impressed me.

A CHAIN LINK BROKEN.

I was running out some 10 miles i country over an unusually bad an road, full of short grades of from cent. to 16 per cent when my attenti arrested by a rhythmical click. I c ly inferred that it must proceed fr chain or sprocket. Examination fa disclose anything wrong. I co homeward, the click continuing som clear and sharp, and at times alm audible. In the absence of known I reasoned that perhaps the sprock become worn and the chain slippe tle. After a run of several miles I home and began a thorough searc jacking up one hind wheel and o the throttle I was enabled to time th and locate it. The outcome was cover one side of the coupling link ly broken through, thereby elongati link and causing the click by ridi then slipping on the rear sprocket. ing the miles of travel and hill cl one side had been sufficient to pr weight of not less than 1,500 l Twice since I have had the same occur. Excepting the regrinding of and the repacking of air and water I have had no annoyances with the ing machinery.

TIRES.

The real soul stirring vexation been from the tires. The very firs a shoe on the rear wheel burst, and the next week I had three pu Since I have averaged two a month oretically the clincher tire is eas paired, but in practice it represents erable hard work. One is fortun deed who repairs an ordinary punc half an hour, and if a new shoe r put on another hour is scarcely su Viewed in the light of a better kno of my car I can see that much of n ation was due to inexperience. If to encounter all again I should be instantly determine the proper thing and would have no worry about i latter months of my running hav particularly free from vexation. Ti

my diagnostic powers, and also the pleasure of automobiling. ing and good roads shall again shall drive my steam horse and hope the pleasant and profitable of the season of 1902.

ectric Automobile for the Physician.

y Guy Hinsdale, M. D.

decided, after months of con- inion, that the electric carriage for my use, I bought an electric with top and wooden wheels and tires. It cost me, fresh from the ith freight charges, $862. Before went to the city where it was the construction of the vehicle hly as I could in two visits and trips with an instructor so as to l its manipulation on the road. rtesy was shown by the makers ned enough of the mechanism to t in case of trouble only a skilled could properly care for the gear ectrical expert must care for the The carriage was delivered Oc- 901, and placed in charge of the lishment existing for the care of les in our city. I mention these show that nothing was spared to od service. I had my driver, a ored man, instructed in operating and he became very expert in t, and I may say for him that we a collision, or even a scratch, r I used the machine. It became the outset that the available stimated at 40 miles, was con- reduced by the rapid discharge nding grades and that this excess iture of current was not com- y the saving of current in their Not until within 3 miles of com- ustion does the voltmeter indi- y manner whatever the degree of and as a consequence an esti- be formed of the mileage covered robable proportion of available the storage battery. I bought a ometer, registering the day's run otal distance traveled, and with uard never ran out of current as attached. This cost, put on,

PUNCTURES.

oon encountered a puncture and a new tire for use while the tire was being repaired. The re- d to be more expensive than I , $4.50, and it required about a der advice I purchased for the what was claimed to be the best t afforded, a very substantial, tire, at a cost of $31.20. I soon f these on my rear wheels, where weight of the batteries caused the rain. I may say that the vehicle assengers weighed 1,850 pounds, sequence there was a serious jolt ed was reduced in crossing street It became a matter of instinct to slow up when crossing the rails or in encountering the wavy and irregular asphalt that borders the tracks as we find them in our city. Pedestrians have no idea of the holes and dangerous places that abound in our streets. The ordinary doctor's buggy usually takes these without any special jolt, but it is quite different with an electric carriage with a short frame, and unless care is exercised at every crossing there is danger that some of the cells will become short circuited by the escape of sulphuric acid and the fouling of connections. Tracks must therefore be taken diagonally to save too much commotion of the acid in the cells. On level asphalt, dry, and with everything in prime condition, my vehicle could travel between 12 and 13 miles an hour and used about 25 amperes of current. The voltage was 102.

ANOTHER DISCOVERY

which I quickly made was that it was not possible to use the vehicle for 5 or 10 miles on one day and for 5 or 10 miles the next day and allow the battery to remain uncharged. In other words, no matter how small a proportion of the power is used the battery should immediately be put on charge when the day's run is made. The battery will deteriorate by a process of "sulphating" unless it is immediately restored to a full charge at the end of the trip. This fact is not usually explained to intending purchasers and the result is that the vehicle cannot be allowed to stand over night away from the charging station and then used the following day—even though 20 miles may be to your credit—without detriment to the battery. This ties one relentlessly to the charging station. I confess that I had the notion that a charged storage battery was like a full bottle from which the contents might be drawn as long as there was anything left to draw, even if three or four days might be spent in completely discharging the battery. Such is not the case—at least it is not practically possible. It is an abuse of the battery which will be visited inevitably by a request for time to make an expensive restoration.

CLEANING.

Storage batteries require cleaning at intervals of about four or five months under ordinary usage, and a large number of wooden separators must be replaced, for which process a week or ten days will be required. The charge which was made on April 17, 1902, for "cleaning the battery, replacing 300 wood separators and electrolyte, and bringing up and repairing battery trays" was $36.28. I used my vehicle seven months, and it will be interesting to others to see what the actual charges amounted to.

COST OF SEVEN MONTHS' SERVICE.

The bills were as follows:

October 31	$24.68
November 30	82.16
December 31	41.60
January 31	29.03
February 28	41.05
March 31	$70.48
April 30	56.70
May 31	33.47

I put the vehicle out of commission about May 15, and the charge for laying up the battery dry, for one new jar, four outside negative plates, one tray and 165 wood separators, cleaning battery and putting in commission again entailed an additional expense of $42.24.

MILEAGE.

I made a comparison of the mileage during December, 1901, with daily expense for current, measuring the mileage by the odometer, with the following result:

December.	Miles.	Cost.
1	10	$0.55
2	20	.77
3	12	.77
4	9	.77
5	10	.72
6	13	.80
7	14	.66
8	16	.99
9	11	.33
10	13	1.21
11	19	1.16

My automobile experience reached a climax when a fire broke out in the storage building where the carriage was kept, and additional repairs amounting to over $100 were required on this account. I was fortunately protected by insurance, and when the vehicle was repaired in the course of the summer I offered the auto for sale, and readily found a purchaser. I then had a good excuse for withdrawing gracefully from the use of the horseless carriage.

My experience is doubtless that of others, but the difficulty is that beginners always underrate the trials and the expenses that an experiment of this kind surely involves.

Trade Literature Received.

Goodrich Clincher Automobile Tires.—B. F. Goodrich Company, of Akron, Ohio.

National Electric Vehicles. — National Motor Vehicle Company, Indianapolis, Ind.

Automobile Bulletin No. 2.—The National Oil Burner and Equipment Company, of St. Louis, Mo.

Caloric Motor Carriage or Hot Air Gas Carriage.—The Chicago Motor Cycle Company, of 107 Madison street, Chicago.

The Morlock Gasoline Runabout.—The Morlock Automobile Manufacturing Company, 394 Ellicott square, Buffalo, N. Y.

1903 Model M. M. C. Motor Carriages.—Motor Manufacturing Company, Limited, 95 New Bond street, London, England.

The Fageol Gas Pipe Automobile Burner.—The National Crude Oil Burner Company, 214 West Locust street, Des Moines, Ia.

Automobiles (Peerless, St. Louis, Knox, Orient, Autocar, Northern, White steam and Waverley electric).—Banker Brothers Company, 629 North Broad street, Philadelphia.

NEW VEHICLES AND PARTS.

The Cudell Twelve Horse Power Tonneau.

(Concluded.)

THE REAR AXLE DRIVE.

The universal joint at the rear end of the "propeller" shaft is of peculiar design and specially adapted to be made dust proof by a leather covering. The short shaft A to which the bevel driving pinion B is keyed is provided with an enlargement C at the front end, which is chambered out to receive the end of the propeller shaft. The end of this shaft is made of square section and with laterally curved faces so that its largest section just fits the opening in the block C. The shaft A rotates in a bronze bushing D which is held from rotation by pins. This bushing is fitted into a bearing hub E bolted to the driving gear casing. To the outer end of this bearing sleeve is screwed an adjustable thrust collar F held in position by means of a lock nut and dog. Over the block C is fastened the dust protecting sleeve G adapted to receive a dust excluding washer at one end and provided with a strengthening rib at the other, behind which the leather protector may be fastened.

The bevel pinion is secured to the shaft A by means of a key, a nut and a split pin, and its end thrust is taken up by steel and bronze washers placed behind it.

The differential gear is of the bevel type and is enclosed in a special case within the main driving gear case, composed of two parts bolted together with a checked joint. The differential pinions turn free upon the arms of a spider H H the hub of which is fitted with bronze bushings from either end. The main gears of the differential are keyed to the tapered ends of the driving axles; they are provided with long hubs which are journaled in bronze bushings I I in the rear axle casings J J. Attention is to be called to the roller K behind the bevel gear L on the differential, which takes up the side thrust of the bevel gear drive. This roller is mounted on an eccentric adjusting sleeve.

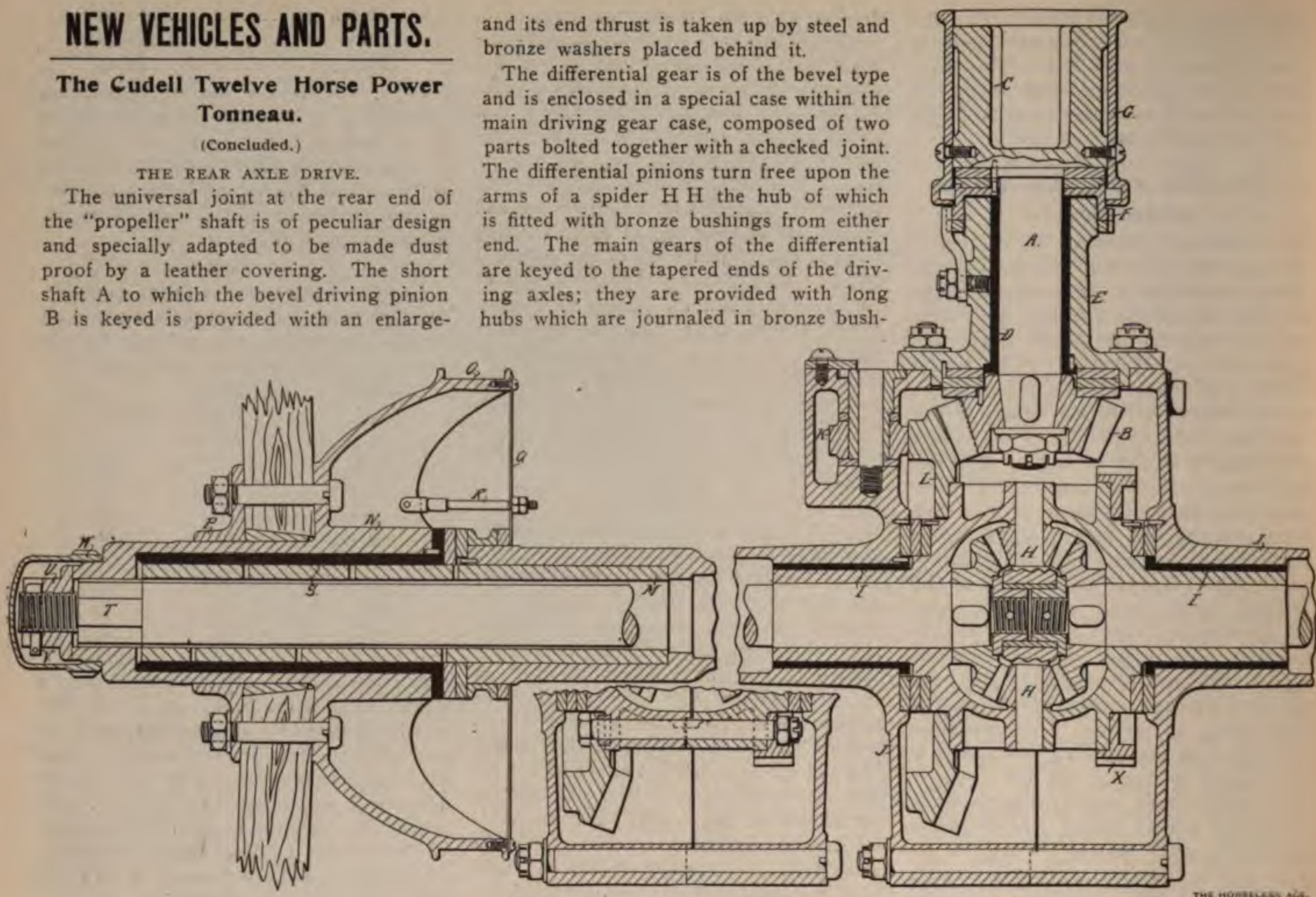


FIG. 1.

The rear axle casing is made of Krupp steel and is strengthened by four wide longitudinal flanges. It extends to near the hub of the road wheel. The outer end is enlarged and counterbored to receive a steel sleeve M which serves as journal for the wheel hub. This sleeve is fitted into the axle casing with a tight joint.

The driving wheels are of the wood artillery pattern and the hubs comprise a main part N, with which the brake drum O is made integral, and the sliding flange P. The brake surface of the drum is located considerably inward from the spokes and the drum is strengthened by radial ribs on the inside. A sheet metal disk Q closes the drum on the inner side, the disk being fastened to the drum by machine screws and to the ribs by an anchor bolt R. The rear axle bearing is right within the hub of the wheel, the latter being provided with a bronze bushing S surrounding the outer end of the steel sleeve M. The outer end T of the driving axle is squared and fits into a squared opening in the end of the hub, thus forming a driving connection between the axle and the wheel. The threaded nut U, with a diametrical slot at its outer end, and the cotter pin V keep the hub in position on the axle. The end of the hub is closed by a cap W.

A point to which attention should be called is the use of wedges under the spokes which force the spokes outward when the hub flanges are drawn together. Another interesting point is that all wearing surfaces at which there is end thrust are constituted by renewable steel washers, in some cases three washers being employed, the outer ones of which are pinned to the relatively moving parts respectively and the central one of which is free, in which case the wear is divided between the opposite sides of the central washer, and sometimes only two being employed, each pinned to one of the relatively moving parts. By this means all wear on the main parts is obviated and any play that may develop owing to wear at the washers may easily be taken out by renewing the washers.

To the case of the differential gear is bolted a ratchet wheel X with the teeth of which is adapted to engage a pawl Y (Fig. 2) fastened to a shaft Z passing through the wall of the driving gear casing. Outside the casing this shaft is provided with a lever arm L_1 and a coiled spring S_1 between this lever arm and one of the bolts of the casing tends to cause the pawl to engage with the teeth of the

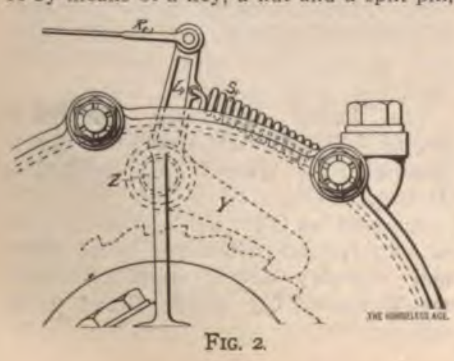


FIG. 2.

wheel, but it is normally prevented oing so by a rod R_1 connecting to a g device near the driver's seat. It obvious that this arrangement is ed to prevent the vehicle backing a grade, thus taking the place of nal sprag.

entire rear axle construction forms tight casing and lubricant is introat the driving gear case and also at er end of the hubs.

total weight of the car with tonody is 1,584 pounds.

·Columbia" Gasoline Touring Car (Mark XLI).

of the recent products of the works Electric Vehicle Company, of Hart-Conn., is the "Columbia" gasoline , which was exhibited to the public first time at the Automobile Show dison Square Garden, New York This car, which is of the high powass, was built after designs of Fred w, to whom patents were granted ing various novel features of conon. In conception and appearance is of the French type, but, unlike cars, the "Columbia" is propelled ngine of large units and is equipped flywheel of such ample proportions ll for but few changes of gear, even lly country. As the exhaust valves erated by eccentrics, instead of by and since the governor does not m out, to reduce engine speed when at a low rate of speed, but throte charge, there is an almost comosence of noise.

accompanying half tones are good tions of the complete chassis. Fig. s a side elevation, Fig. 2 a plan (top and Fig. 3 a perspective view of the

THE RUNNING GEAR.

wheel base of the vehicle is 7 feet 9 and the tread is standard. The have a diameter of 34 inches and d with Diamond detachable pneutires. The manufacturers give the ser an option on the make of tires. r. All the wheels have twelve spokes ain, bronze bushed artillery hubs. ont axle is a solid steel forging of a section (1⅜x1⅜ inches) between ings, and of an oblong section (1⅛x hes) adjoining the knuckles. The are of a peculiar and neat design. olster pins are hardened and ground rigidly secured to the axle proper and to a nut above, which rests on and balls. Friction in this part of ering device is thus reduced to a m. The rear axle is stationary, that y it does not revolve, and is also a orging of 1x1½ to 2⅛ inches. All ings rest on their respective axles of being hung from them, and to e a low centre of gravity the design s "dropped" axles.

ont the frame rests on semi-elliptic springs of five leaves. The free length of these springs is 34 inches and the leaves have a width of 1¾ inches and are about one-quarter of an inch thick. A novel feature is a short leaf which rests on the main leaf and prevents excessive recoil whenever the spring is relieved of an unusual strain. The rear springs are of the "buttonhead" full elliptic type and are also 1¾ inches wide, but 36 inches in length. Rubber buffers are employed front and rear to prevent the springs being deflected too much and to guard against fracture.

The frame consists of a main and a false frame, to which latter the machinery is secured. The main frame is of rolled shapes of T section and is braced with ash sills. The goosenecks are welded to the frame

FIG. 1.

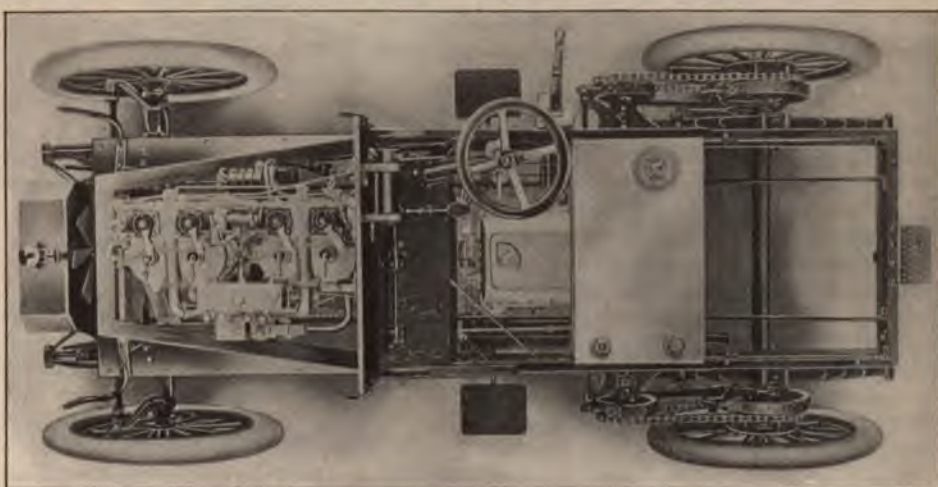


FIG. 2.

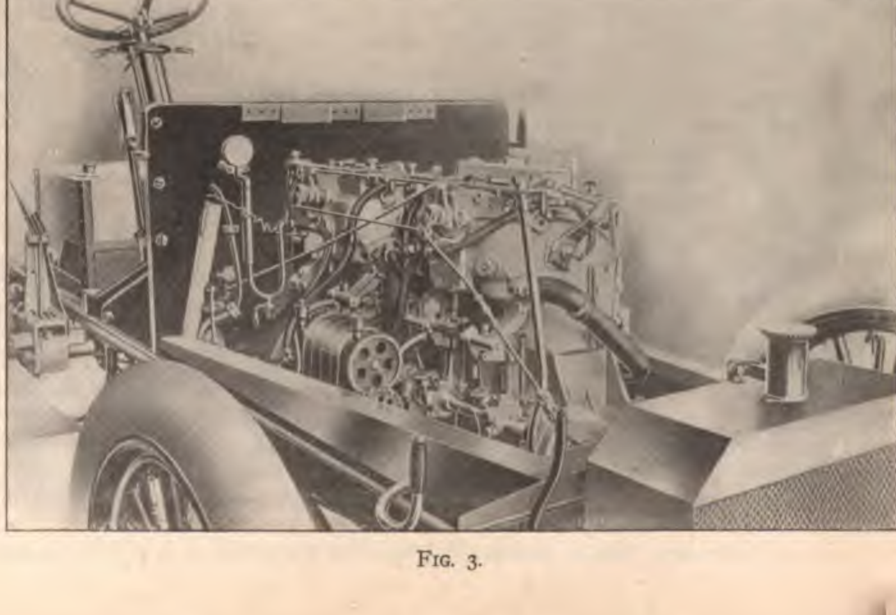


FIG. 3.

bars and are of the same section. The false frame is built up out of channel steel bars, which are trussed. The footboard and dash are independent of the body and are secured to the frame. An aluminum bonnet with ventilating slots on the sides and brass molding is hinged to the dash. In addition three large doors are provided in the bonnet to permit access to the engine.

THE MOTOR, IGNITION DEVICES, COOLING APPARATUS, ETC.

Although the engine is rated at only 24 horse power it is claimed to be capable of developing 26 brake horse power. Its bore and stroke are equal to 5 inches. The normal speed is about 800 to 900 revolutions per minute, though the governor controls as soon as 450 turns are exceeded. The motor is capable of a great range of speed (150 to 1,200 turns per minute) and should prove to be very flexible.

The crank cases are aluminoid castings and are bolted to arms of bronze, which constitute the members of the structure that carry the engine. A pair of cylinders thus has a case of its own. Either case may be removed without affecting the other one. The crank shaft is of the four throw type, with pairs of crank pins opposed to the other pair. The journals are 1¾ inches in diameter. The bearing adjoining the flywheel is 5 inches long, the central bearing 6¾ and the forward bearing has a length of 4 inches. The crank pins are 1⅝ inches in diameter and 3½ long. All bearings are bronze bushed and well lubricated. The connecting rods are drop forgings and have crank pin heads of the marine type, with phosphor bronze boxes. Mr. Law departs from conventional practice in the matter of securing the wrist pins by permitting them to oscillate in the hubs of the pistons instead of in the rod ends. It is claimed that better lubrication of the pins is obtained in this way than by the other method. The cylinders are cast in pairs with integral heads and are provided with large water jackets. The admission valves are of the induction or automatic variety and are located in line with and above the exhaust valves. To remove these valves it is only necessary to turn the handle of the locking device one-eighth of a turn and the inlet valve may be withdrawn. The device mentioned is of the breech block pattern, with intercepted thread and is quite similar to those employed in connection with large rifles. The exhaust valve mechanism is clearly shown in Fig. 3. Eccentrics raise the valves from their seats and a pair of extension springs pull the valve down again to its seat. In this case the tension of the springs need not be overcome by the mechanism when raising the valves. Lubrication of the eccentrics is by grease cups, as shown.

A single carburetor is employed to generate the mixture. It is located on the left side of the engine and has a pipe running to each pair of cylinders (see Fig. 2). These pipes conduct the mixture into a chamber of circular section, which is cast integral with the cylinders. A slotted sleeve is located in each of these chambers, and is provided with a lever arm, which is linked to the corresponding lever of the other pair and to the thumb lever on the control column. Inside of each of these slotted sleeves are valves, which are controlled by the governor, as shown distinctly in Figs. 1 and 3. In most high class French cars it is necessary to increase the spring pressure on the governor to accelerate the speed of the engine. That is not the case in the "Columbia," where the governor is not disturbed by the operator at all, but the slotted sleeves alone are actuated or set to increase or reduce the rate of speed of the engine relatively to the normal speed. In connection with the carburetor it must yet be said that it is of the aspirating type and is fitted with an automatic mixing valve and a hand operated "justifier."

A large sight feed lubricator with four connections or "points" is bolted to the engine above the carburetor. The lubricant flows from the oil receptacle to each cylinder through flexible metal tubing. In time a small bath is created in the crank cases, and the reciprocating and revolving parts are subjected to splash lubrication. A small tube between the lubricator and the exhaust pipe causes the oil to feed under pressure. Clogging of the oil ducts in consequence becomes at most a remote possibility.

The manufacturers have not decided definitely whether to adopt a honeycomb cooler or a flanged radiator as their standard, and at the present time exhaustive tests with both types are being made with a view to determining the relative merits of these important members of a gasoline machine. The water system contains about 10 gallons, of which the tank holds about 8 gallons. The tank is built up out of sheet copper and has riveted and soldered joints. One of the cars built by the company was equipped with a radiator consisting of forty-five three-quarter inch copper tubes, 27 inches long. To each tube copper disks of 1 15-16 inches diameter had been soldered. The water flows from the jackets to the radiator, then to the tank and ultimately back to the engine, by way of the pump. The latter is positively driven and of the gear type. A standpipe for filling purposes was also fitted.

Ignition is by jump spark and the Eisemann system, which was fully described in the issue of February 4, 1903. The magneto is gear driven and but one coil, bolted to the dashboard, is used. The spark plugs are secured by the same kind of locking devices as those of the inlet valves. To keep these devices from loosening a coiled spring is provided, which keeps the arm taut (see Fig. 3). All the wires that conduct the secondary current are stranded and well insulated. The switch is of the electric light pattern and is located in the dash.

The first and fourth cylinders have a separate exhaust pipe, while No. 2 and expel their spent gases into a bifu pipe. All three pipes terminate in a pipe, which carries the gases to an e ing chamber and then to the muffler.

An up to date appliance is a water gauge in the dasher.

THE FRICTION CLUTCH AND CHANGE GEAR.

The friction clutch is of the conica the flywheel constituting the female ber. The male member is an alu cone with a leather lined face. A n of blocks of bronze are built into th which engage before the leather t firm hold. Leather when in a dry tion is bound to bind without slipp any extent, first. Blocks of metal, other hand, will not start the vehi with a jerk, provided that springs o able tension are employed. The fl has a diameter of 15 inches, a fac inches and an average thickness of approximately 1⅛ inches. The tra sion device is of the sliding or clas type and gives four forward and a r speed, with direct drive on the h speed. All the gears are cut to a pitch to facilitate engaging them. are of machine steel and case har and run in a bath of oil. The uppe of the gear box is of aluminoid a lower half is a bronze casting. A bearings are plain and a spur gear di tial is employed. The simple lat means of which the inspection lid gear box may be removed is shown i 2. A single lever is employed to sl the gears, including the reverse. Thi operates in a gridiron quadrant, wh equipped with a hinged latch that pr the operator from engaging the r gears accidentally. An interlocking is also fitted to oblige the driver to the clutch before changing gears.

The countershafts to which the d sprockets are secured revolve in plain ings. To each sprocket the brake p are secured, which are controlled by acting band brakes. The drive t driving wheels is by separate chains. erful hub brakes are also provided. the brake bands are lined with bloc hard wood and are brought to be double acting mechanisms.

THE CONTROL DEVICES.

Steering is effected by means of a and a skew gear and rack device, whi ter operates in an oil bath. Uni joints of ample proportions, instead and socket joints, are used in conn with the main steering link. The gency brake lever penetrates the foot to which its quadrant is secured. lever applies the hub brakes and m thrust forward without disengagin latch, the teeth of the sector being c those of a saw. The countershaft are applied by a foot pedal. Gr around the steering column are three levers for the throttle, mixture ar

spark timing. Both the brake pedal and brake lever disengage the clutch automatically, before locking the brakes. A separate clutch lever is also fitted. (The speed changing lever has been mentioned above.)

LOCKING DEVICE FOR COUNTERSHAFT.

In the event of a chain breaking the differential gears can be locked by means of a clutch on the countershaft operated by a rod extending out through the top of the gear casing. The vehicle can then be run with one chain.

The fuel tank is located under the front seat and has a capacity of 15 gallons. It is of sheet copper, riveted and soldered.

Fig. 4 illustrates the locking mechanism of the hand hole plates of the crank cases. The sketch is not to scale and only illustrates the principle. Less than one-sixteenth of a turn of the bent rod is required to remove the plate completely.

THE BODY.

The car is fitted with a body that will accommodate two persons in front and

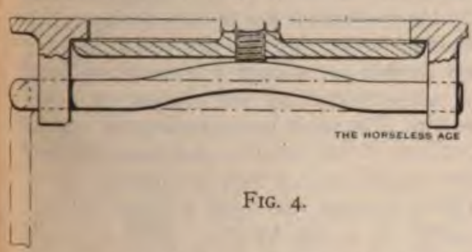


FIG. 4.

four in the back. All the vehicles now building will have a longer tonneau than that fitted to the machine that was put on exhibition at the leading shows. The front seat is divided and the tonneau is readily detachable, leaving a platform for a trunk or hamper. The upholstering is either plain or tufted and of a color to harmonize with the paint of the body. The back rests are trimmed with brass moldings.

The Whitney Steam Car.

The Whitney Machine Company, of Brunswick, Me., have just completed a substantially built steam car with very long wheel base (80 inches) and 30 inch wood wheels shod with 3 inch pneumatic tires. The carriage has the standard road gauge and is fitted with a sheet steel body of steel plate one-sixteenth inch thick. The boiler is placed in a compartment in front, has a steel shell 16 inches in diameter and is fitted with copper fire tubes. All the boiler fittings are placed on the dashboard, directly in front of the operator, where they can be read without the aid of mirrors. The boiler is provided with down draft. The engine is entirely encased and is fitted with anti-friction bearings. It is geared to the rear axle by means of a chain. The gasoline is fed to the burner by means of a gasoline pump and only 1 pint is carried under air pressure. The gasoline tank is located in the extreme rear of the car and is encased in a wooden box to prevent chafing and causing leaks. The water tank is located under the seat. The controlling

BLAISDELL & CO.'S STEAM DELIVERY WAGON.

mechanism comprises one hand lever for the engine throttle and two pedals for the engine reverse and brake respectively.

United States Long Distance Delivery Wagon

Woodward & Lothrop, of Eleventh and F streets, Washington, D. C., were one of the first large business houses in the country to experiment with automobile delivery wagons. They have tried successively the various motive powers with more or less success, and have recently put in service the gasoline delivery wagon herewith illustrated, which is of the United States Long Distance Automobile Company's manufacture. The vehicle is equipped with a double cylinder motor in front, wheel steering and solid rubber tires on wood wheels of comparatively large diameter.

The Blaisdell Delivery Wagon.

The accompanying half tone and drawing illustrate the chassis and body, respectively, of the steam driven delivery wagon which was designed and built by J. F. Blaisdell, of Brooklyn, N. Y. That the designer succeeded in disposing the boiler and machinery in such a way as to permit access to them and the pipe system is evident. The boiler is located in front of the dash and over the front axle, while the engine is hung from a frame to which the operator's seat board is secured. The water tank is at the extreme rear and is hung from the main frame. Thus the entire body (proper) represents room for carrying merchandise.

SPECIFICATIONS.

The wheel base of this wagon is 7 feet 6 inches and the tread is standard. The wheels have fourteen spokes and Timken tapered roller bearings, which are adjustable and dust proof. The front wheels have a diameter of 32 inches and the drivers are 36 inches in diameter. All the wheels are shod with 2½ inch Firestone "side wire," solid rubber tires. The frame rests on semi-elliptic springs in front and platform springs in the rear. The dimensions of these springs are: Length, 38 inches; width, 2 inches. Each spring has seven

UNITED STATES LONG DISTANCE DELIVERY WAGON.

leaves of about one-quarter inch in thickness. Only oil tempered Swedish steel entered into them. The goosenecks and step brackets are of Norway iron. A hub is forged onto each step bracket and the shackles of the front springs are secured to these hubs, as shown. Both axles are of solid steel and measure 1½x1¾ inches.

The frame is of I beam, rolled bars and its cross section measures 3x2¼x¼ inches, approximately. To prevent the roof and the boiler being damaged in case of a collision, the frame is provided with a "bumper" of strap steel, bent to a crescent and riveted to the frame.

The boiler is of the water tube type (Salamandrine) and is rated at 15 horse power. It is 28 inches high over all and has a diameter of 24 inches. Gasoline is employed as a fuel. The burner is equipped with a pilot light. The flues are located on top and in front and terminate in two vertical sheet metal stacks, which conduct the burnt gases to the atmosphere above the roof.

The engine (Mason) is of the ball bearing type and has two double acting pistons (3⅛ inches diameter, 4 inches stroke) and is rated at 10 horse power. It is fitted with a crosshead boiler feed pump, but no air pump. The drive to the differential is by means of a block chain and from the countershafts each driver is driven separately. Diamond chains one-half inch wide and 1½ inch pitch are employed. The shafts of the balance gear run in long, bronze bushed bearings. The engine's sprocket has ten teeth; the differentials have nineteen, and the others have twelve and thirty-one teeth, respectively.

A Nelson valveless pump represents the auxiliary boiler feeder and a Marsh steam pump keeps up the air pressure. Fifty to 60 pounds of air are carried in the air tank, which, like the gasoline tank, is of drawn steel. The working pressure of the boiler is 200 pounds per square inch. The hand pump, for filling the boiler before starting out, is located above the foot board and next to the dash. The latter is secured to the frame and serves as a background for all those boiler fittings which may require attention. They consist in: Water column, trycocks, valve to control air pump, auxiliary throttle valve, valve to control auxiliary feed pump, and a valve by means of which the diaphragm may be cut out in case it should give trouble. Positive lubrication of the engine is provided for, a mechanical oiler with ratchet device being used.

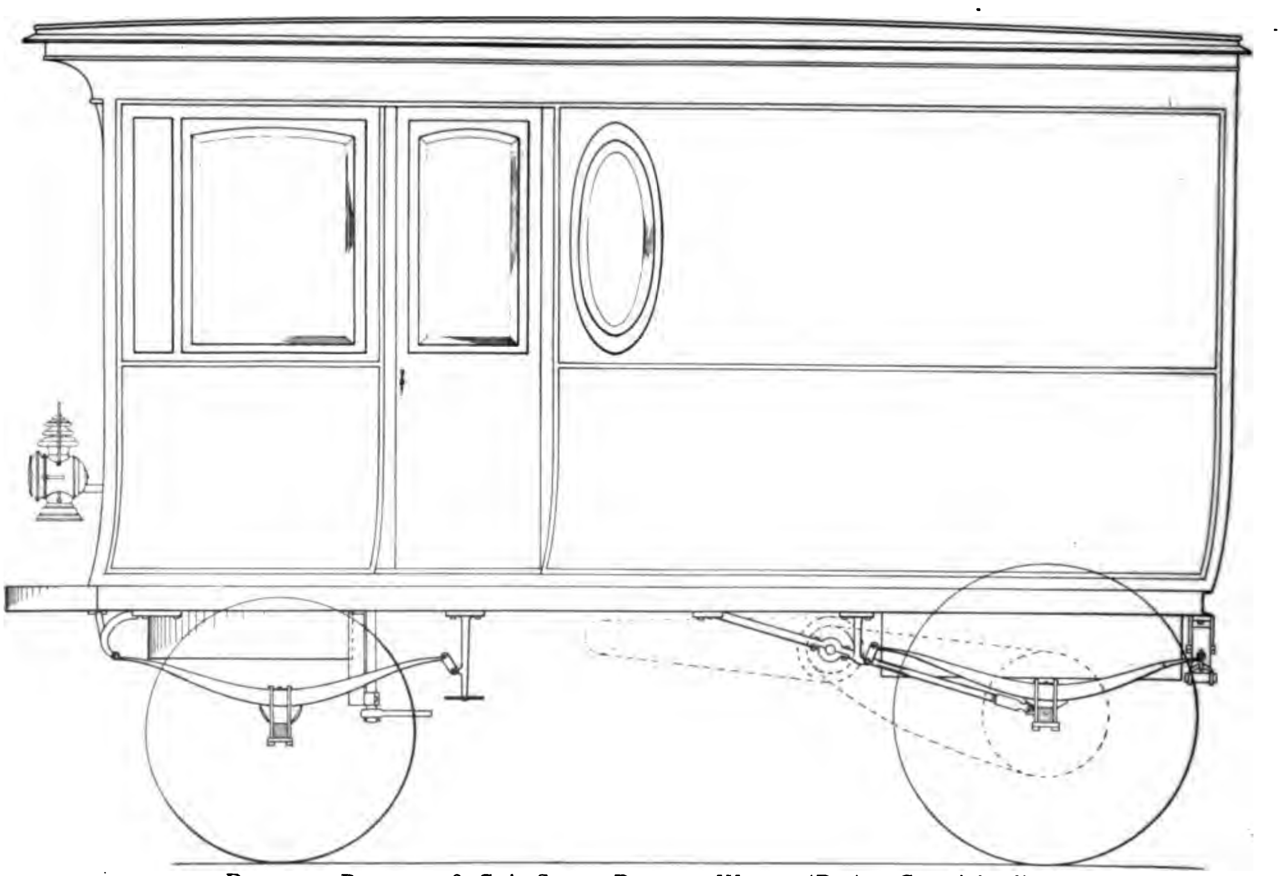
The capacity of the gasoline tank is 18 gallons. That of the water tank is 60 gallons. The latter is of galvanized iron and is riveted and soldered.

The control devices of the wagon are: A tiller for steering; a throttle, which is provided with a locking device; lever to control the Stevenson links (provided with latch and sector); a lever to apply the emergency tire brakes (also equipped with latch, etc.), and a heel pedal, which applies the double acting band brakes of the differential drum.

The weight of the wagon, inclusive of supplies, is about 3,000 pounds. It is intended to carry 1 ton at a maximum s of 12 miles per hour. To protect the dr in inclement weather the body is encl all around. The windows are fitted beveled glass panes. All bolts that it w not do to rivet over are provided with pins.

The Eldredge Road Car.

The National Sewing Machine C pany, of Belvidere, Ill., are manufactu a 1,600 pound gasoline road car, of w a general view and a plan of the ch are shown herewith. The car has a w base of 68 inches, standard tread of 56 in and 30 inch wood artillery wheels fi with 3½ inch detachable tires. The en is a four cylinder horizontal one an located in the body of the vehicle. cylinders are arranged in pairs on opp sides of the crank shaft. The manu turers claim that the speed of the en may be varied from 100 to 1,200 rev tions per minute by means of the thro At 250 revolutions per minute the engi claimed to develop 4 horse power; at revolutions per minute, 8 horse power, at 1,000 revolutions per minute, 12 h power. The valve boxes are located on top side of the cylinder. All four cylin are supplied by a single carburetor. I tion is by jump spark and with current nished by a dry battery. Only a si spark coil is employed. The plan vie the chassis plainly shows the spark p on opposite sides of the double valve b and the cable connections leading to t



DESIGN OF BLAISDELL & CO.'S STEAM DELIVERY WAGON (Design Copyrighted).

the commutator on the half speed
.
e friction clutch is mounted on an ex-
on of the engine shaft, and a hub on a
part of this clutch connects by a chain
ne of the shafts of the variable gear
variable gear is enclosed in a casing
r the seat of the car; it gives two for-
l speeds and one reverse, and all gears
out of mesh when running at high
d. From the variable gear the power
nsmitted by chain to the live rear axle.
gear reduction is such that the car
24 miles per hour on the high gear
the engine running at 600 revolutions
minute. The engine is claimed to be
ciently powerful and the clutch (which
f the multiple disk type) sufficiently
oth acting to allow of the car being
ed on the high gear.
e friction clutch is operated by a pedal
r the left foot, and a continued motion
e same pedal applies the brake. The
s also fitted with an emergency brake,
h is operated by the right foot. The
s for controlling the change gear are
ed in the centre of the vehicle, and the
ttle lever is arranged just below the
ing wheel. The steering is by an in-
d hand wheel, and through a non-re-
ible mechanism.
l the machinery is mounted on an an-
and channel steel frame, which is sup-
ed on the axles by means of platform
gs, both in front and rear. The body
be detached from the framework by

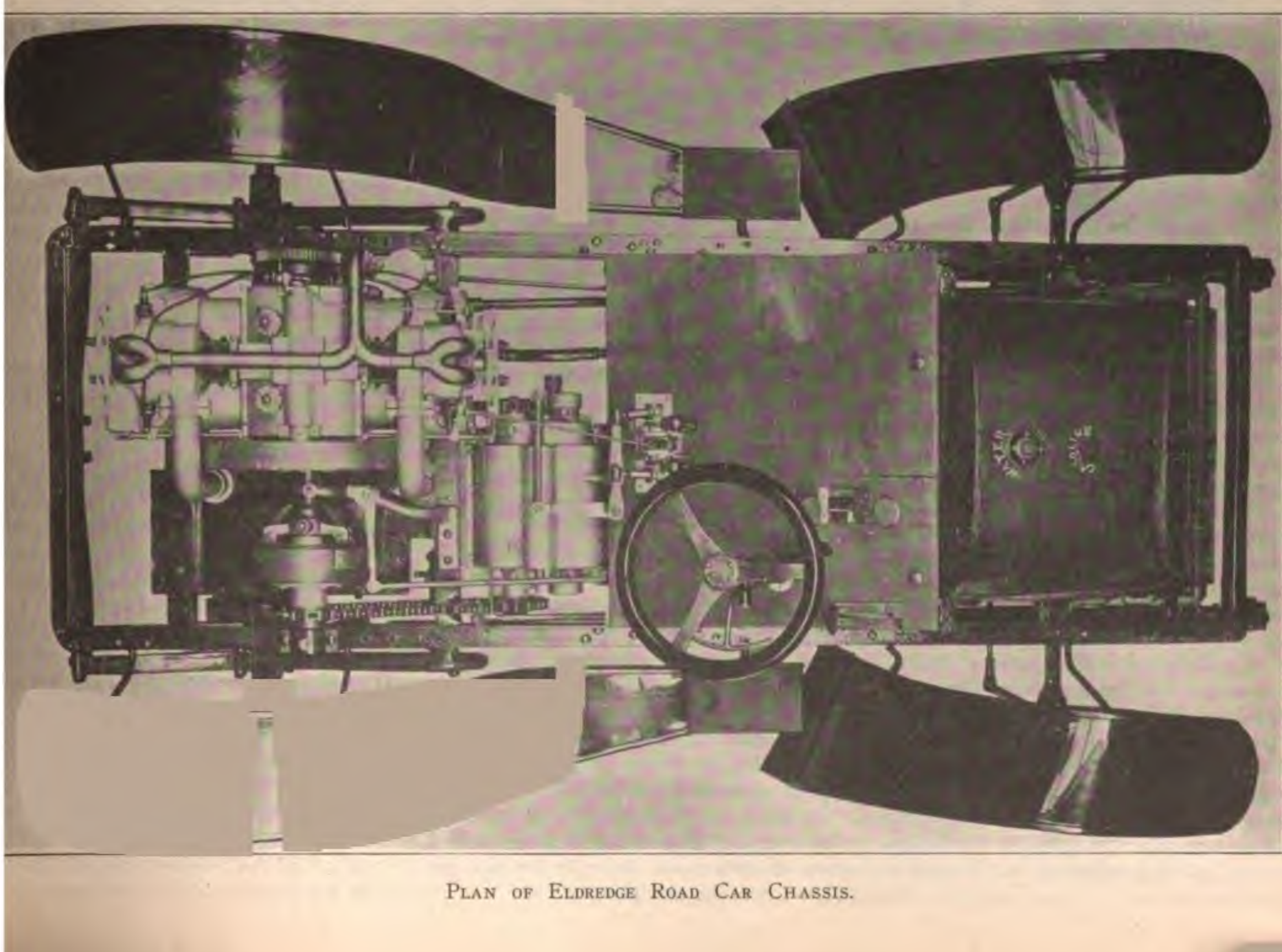
Eldredge Road Car.

removing five bolts. The differential gear on the rear axle is of the spur wheel type. The gasoline and water tanks are carried under a hood in front, the former holding 11 and the latter 5 gallons.

The National Sewing Machine Company have very extensive works at Belvidere, Ill., and they inform us that these vehicles are built complete in their own factory, under their own supervision and control, and every part has been designed to fit together and correspond in strength with every other part.

King's Jump Spark Intensifiers.

Charles B. King, Detroit, Mich., manufactures the spark intensifiers shown in the accompanying cuts. The "intensifier terminal" is said to represent a simple and efficient manner of curing spark troubles. Another intensifier is shown in a case in-



Plan of Eldredge Road Car Chassis.

tended for dashboard use. It is here shown arranged for four cylinders. These enclosed type intensifiers are, however, sup-

King's Intensifier Terminal.

plied for any desired number of cylinders.

The devices operate on the well known principle that a spark gap interposed in the secondary circuit outside of the spark

King's Enclosed Multiple Intensifier.

plug intensifies the current to such an extent that it readily jumps between the proper points in the spark plug regardless of cylinder oil or soot. The slight train of fire apparent on a dirty spark plug (when the current takes a short cut across the sooted porcelain) indicates a drain in the secondary current to such an extent that its disruptive power is gone, and as a result no spark appears between the points in the spark plug. Mr. King claims to have used the spark gap intensifier with success for several years on engines manufactured by him.

Enormous quantities of red lead are employed in storage battery manufacture and other industries, and it is important to ascertain whether it is in a state of sufficient purity. The different processes in use for testing red lead consist in converting it into an oxidized pulp, then reducing this oxide by a suitable reagent, so as to be able to dissolve the oxides of lead completely in nitric acid. The reducing substances employed ordinarily are oxalic acid and sugar. It is proposed, says the *Revue des Produits Chimiques*, to substitute for the employment of these substances that of oxygenated water. The following is the mode of operation: Two and five-tenths grammes of red lead are treated with 20 cubic centimetres of dilute nitric acid (1 part of acid to 1.39 and 4 parts of water) and shaken. The red lead being thus converted into the oxide, the oxygenated water is added gradually while shaking. A few drops are sufficient to cause the oxide to disappear in a short time. If the red lead is free from colcothar, sand, barium sulphate and other impurities, a solution, limpid or nearly limpid, will be obtained in a few minutes.

Care and Maintenance.

Practical Hints on Gasoline Automobiles.

By E. J. Valentine.

Did anyone ever consider the effect on a carriage of speeding the motor up to 700 or 800 revolutions per minute and then throwing in the clutch suddenly? Something is going to give away after awhile, either the crank shaft, transmission, chain or running gear.

It is always a good idea for an automobile operator to look over his carriage regularly, to keep all nuts tight, chains clean and properly adjusted and all bearings clean, well oiled and adjusted so as to run smoothly without binding.

It is not to be recommended to run an automobile down hill and over rough roads as fast as it can go; it may stand it for awhile, but is sure to give much more trouble later on than if it had been used more carefully.

If your carriage is propelled by a gasoline motor you should periodically examine the gasoline pipes and carburetor and remove any dirt that may have collected in them. Use a strainer in filling the tank.

The connections of the ignition system must always be kept in good condition. Stamped copper terminals soldered to the end of the wire insure a better connection than wrapping the wire around the binding post.

The most frequent causes of a gasoline motor stopping are the following: Weak battery, loose wire, dirty spark plug, leaky inlet or exhaust valve, weak, worn out or broken piston rings, loose or broken timing device spring.

When valves leak they must be taken out and ground in their seats with very fine emery and oil. Put the oil and emery on the valve and rotate it back and forth on its seat, grinding it just enough to make a bright mark all around the valve and seat. Never use a file on the valve.

Sometimes a leak in an exhaust valve may be detected by disconnecting the muffler and putting the ear to the exhaust passage while someone slowly turns the starting crank.

If a motor that has good compression refuses to start, go over the wires, timing device and vibrator, and if these are found all right try the spark plug by taking it out of the cylinder, connecting the wire to it and laying it on the motor in such a manner that the threaded part is in contact with the metal of the motor, and then starting the crank. If you do not get a spark, examine the batteries.

Do not separate the points of the spark plug too far; if you do, it may show a good spark outside the cylinder and yet fail to ignite the charge.

Keep the batteries well packed in so they cannot jar around and slop over, and keep them dry.

Do not let the exhaust and inlet valves get gummed up. You can detect whether they are gummed by raising them with the finger. If gummed, clean them off with a little gasoline and then put some oil on the stems.

Keep cam shaft, cams and spiral gears well oiled. I have seen spiral gears worn out in 500 miles owing to not having received any oil.

For cylinder lubrication use the best gas engine cylinder oil you can get, but do not use too much, as it will cause a smoky exhaust and is liable to get on the spark plug and cause the engine to misfire. On the other hand, if it doesn't receive enough oil, the increased friction of the rings and piston will cause the motor to overheat.

Too rich a mixture will cause the motor to misfire, produce a smoky exhaust and reduce the power.

A motor can sometimes be started more readily by taking out the spark plug and putting a small quantity of gasoline into the cylinder.

If you make it a rule, when starting out on a trip or ride, to "know" and not only "think" that your gasoline tank is full you may save many a long walk after fuel.

Never allow your cooling water to run out and your motor run without water in the cylinder jacket. If the motor becomes too hot it is liable to cut the cylinder, burn the packing and warp and twist the valve seats.

If the motor has a tendency to overheat, it may be due to not enough cylinder oil being used, the water circulation not being good, or the exhaust valve not being timed right or not opening quick enough. It is better to inquire at the factory about that, though.

One cause of want of power in a motor I have found to be a partly stopped up muffler or one not large enough for the motor.

A pound in the motor may be caused by a loose flywheel, crank shaft bearing or connection rod bearing, or the ignition may take place too early for the speed at which the motor is running.

If water gets into the cylinder, the best thing to do is to take off the cylinder head and carefully clean off every trace of the old gasket, not using a file on the joint, however. Then get some one-sixteenth inch sheet asbestos and cut out a new gasket, being careful to cut it so os that all passages will be perfectly clear. Wet the new gasket and place it on the head and sprinkle the opposite side, which is to go next to the cylinder, with fine graphite (Dixon's No. 635) and place the head on the cylinder, then draw up the nuts on the studs evenly all around, but do not draw them up too tight, as you might pull the study out of the cylinder or crack the head.

By putting graphite on an asbestos gas-

putting it in place, it may be
ith much less trouble and work.
oting to take off a cylinder head
any kind of tool between the
d head.
ier in driving an automobile I
se to take plenty of time at the
dy his machine. Begin by start-
ig, backing, etc., and don't head
irt of the city on the first trip;
your lessons on a little traveled
eet—people will find out quickly
t you have an automobile.
understand your machine thor-
l to quickly locate any trouble
neet. This will enable you to
repair station and to direct in-
he repairs to be made.
ver take your machine apart be
l to get everything back in the
ce. One must be pretty well ac-
ith a gasoline motor to get the
into the correct position.
lve gears of a gasoline motor
ne tooth out the engine will not
t does it will give practically no

smission gear of a gasoline en-
d be given plenty of oil, but in
to the lubrication do not pour
r everything in sight, not only
the waste but also because it
t.
in up to or near your stopping
ll speed and then put the brakes
ust to see how quick you can
automobile should always be
gently as possible, and started
e way.
of any vocation can learn to
automobile and learn to do it
vants to, but it cannot always be
lay or a week. Two years ago a
of my acquaintance bought a
chine of standard make. The
k his auto education in charge,
instructions and any help when
it, and he became an expert
and was able to go anywhere,
making a trip from which he
return in a week; he has never
boiler or run into anything, and
been hauled home.

Alcohol as Fuel.

ew experiments have been car-
cently in one of the official lab-
of Austria on the value of de-
cohol as a fuel. For motive pur-
ir of nominal 8 horse power en-
designed for alcohol and one
ne, were compared. The gaso-
a specific gravity of 0.7 and a
lue of 7,700 calories per litre; the
on per horse power hour was 340
The alcohol was of 90 per cent.
nd had a calorific value of 4,900
er litre; its consumption was
mes per horse power hour. The
were, therefore, 16.5 per cent.
soline and 28 per cent. for the

..COMMUNICATIONS..

The Business Vehicle Discussion.

Editor HORSELESS AGE:

My recent remarks on commercial vehicles having caused comment in the last issue of your journal, I feel bound to correct the misstatements of the published reports. As to steam vehicles, there is no question but that the freezing difficulty can be overcome while the machine is under steam. But there are other conditions to be met, and there are other difficulties connected with steam vehicles for commercial uses that are more serious than the freezing. At the same time there will always be places and uses for which the steam truck will be the most suitable and will be used in preference to others.

Referring now to the method of operating gasoline trucks, I said that "possibly" it might be found advantageous to run them at constant speed, etc. But even if I had omitted to qualify the statement, your editorial of March 25 is quite in error as to the method of operating cars with constant speed motors, as, for example, Panhards of two years ago. In cars of this sort one does not constantly change gear in traffic, or have any of the troubles that you suggest. Your one pedal for both clutch and brake with no separate clutch pedal is entirely wrong, and has been so proved by years of experience.

EDWARD T. BIRDSALL.

[That it has been proved that "one pedal for both clutch and brake is entirely wrong" must refer to experience with pleasure vehicles. There might be some difference in this regard between a touring car, which it is frequently desirable to let coast, and a motor truck, which could practically never coast, and in this as in other matters it might turn out that what is best adapted to touring cars is not necessarily the best for commercial wagons. In fact, this we took to be the leading thought of our correspondent's remarks on gasoline business vehicles at the discussion referred to.—ED.]

Graphite Lubrication.

CHRISTIANIA, Norway, March 14.

Editor HORSELESS AGE:

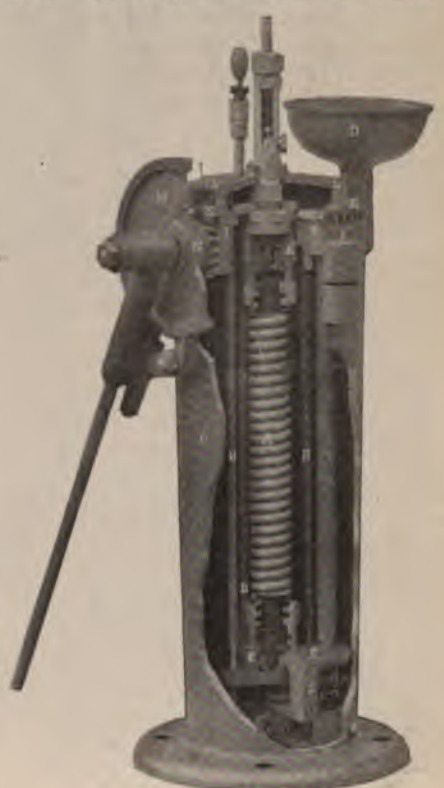
As a most interested reader of your esteemed journal I take pleasure in handing you herewith a cut of a lubricator for graphite mixed with oil, which I think would be found very satisfactory for use on automobiles, where a reliable lubricator is most appreciable.

I have run German cars and have here at present three American steam cars with their very "unsight" feed lubricators, either feeding almost no oil or emptying themselves in a few minutes.

The enclosed lubricator has been thoroughly tested by me for some six weeks and I found it to work very well. Relying on the claims of the manufacturer, I let the engine (125 horse power compound) run for fourteen days with the lubricator on and then disconnected it entirely for the following fourteen days, and during that entire time the engine worked without any lubrication at all. The reason that no lubrication was needed was that the graphite (Dixon's flake graphite, mixed with a cheap grade of oil was used) had filled all the pores of the cylinder walls.

I think this lubricator would do good work on heavier motor vehicles, and should be much interested to learn if any of your readers have had experience in graphite lubrication of automobile motors.

The principle of this lubricator is very simple. A corrugated tube A with valves



GRAPHITE LUBRICATOR.

E is caused to oscillate by turning the plate L against the body K, thus acting as a pump without piston, and pumping the graphite suspended in the oil to the engine. A mixing propeller wheel P driven by wheels *w* serves to keep the graphite suspended in the oil. This device appears to me invaluable in saving oil and wear on the machinery, and it also helps to tighten the boxes from the inside by filling them with graphite.

F. HIORTH.

[The mode of operation of the pump seems to be as follows: The ratchet wheel M is driven from the engine by means of a pawl and link connection. In one piece with the ratchet wheel M is the bevel pinion N, which meshes with the bevel gear crown K surrounding the upper cover of the reservoir. This bevel gear crown is provided with a cam face on top (as indi-

cated by arrows), with which engages the cam surface on the cover plate L. As the bevel gear crown K rotates the cover plate L is raised and lowered alternately, and with it the valve housing E at the lower end of the corrugated tube, which is fastened to it by the rods H H. When the lower valve casing moves downward, which it does under the elastic force of the corrugated tube, the lubricating mixture is drawn into the tube, and the valve case is forced upward by the cam surfaces on K and L, the valve at the bottom of the corrugated tube closes and the mixture is forced out of the tube to the engine through the connection P.—Ed.]

The Edison Battery.

Editor Horseless Age:

I am the owner of an up to date electric carriage (one seat) fitted with thirty cells of exide batteries, and have a first class charging plant, large enough to charge three carriages like mine.

I am so pleased with the ease and comfort of my electric, with its 7 foot wheel base, that I am going to get a larger one to carry four, from the same makers.

I have heard a good deal about the Edison battery, but can get nothing definite on the subject. I should very much like to know a few particulars about, say, a forty cell battery—the weight, amperage, size, cost, rate of charging, and the average life of the battery. Can you give me this information in your valuable paper?

E. P. Mitchell.

[With regard to Mr. Edison's battery, we are in about the same position as our correspondent—that is, we have also heard a great deal about it, but not much of a definite character. Although it will be two years next month that the battery was first described before the American Institute of Electrical Engineers, no deliveries have yet been made to the public as far as we have been able to learn. Some of the latest figures given out by the inventor are as follows: The average discharge E. M. F. is about 1.2 volts, and since the average discharge E. M. F. of a lead cell is about 2 volts, if a lead battery is to be replaced with an Edison battery five cells must be used for every three in the lead battery. The capacity is given as 11.2 watt hours per pound of battery. We believe the carriage to which you refer carries thirty cells, so that about forty-eight cells of Edison battery would be necessary to replace it. If each of the cells weighed 8 pounds the total weight of the battery would be 384 pounds, or somewhat over 400 pounds with trays. The ampere hour capacity would be 75, the discharge voltage being practically the same as with your present thirty cells. This will enable you to compare the capacity of your present cells with the capacity claimed for the Edison cells. But we really do not see that it will do you any good as long as you cannot get the cells.

Mr. Edison further claims that with his battery runs of 40 miles can regularly be made on one charge. About the dimensions of cells we have no information.—Ed.]

Battery Query.

Editor Horseless Age:

I am a reader of your valuable paper and would like to have a little information through its columns.

I use dry cells in my automobile and have a pocket voltmeter for testing them; yet from the experience I had a few days ago I do not feel safe to make a trip of any distance without taking extra cells along. I tested the cells and they showed 1 1-10 volts each, yet eight cells would not make the sparking coil work or produce a spark hot enough to explode the mixture

Will it require an ammeter to test the amperage, or do the voltage and amperage become exhausted at the same time? If this is the case, what is wrong with my cells?

I placed six new cells in that tested the same voltage that the old ones did, and they gave me no trouble.

I would like to hear from someone who has had experience along the same line, and how best to remedy the matter, so that I would know I would have battery strength enough to get back home from a small trip. J. H. Wiley.

[An ammeter is more reliable for testing the battery than a voltmeter, as the cells may be dried up and have a high internal resistance which would affect the voltage but very little but greatly affect the amperage. It is the current (amperage) which flows through the coil that determines the volume of the spark. We believe it is best when dry batteries are used to always carry an extra set. If they should accidentally both run down on the road they should be connected in parallel—that is, the positive terminals of the two batteries should be connected together and the negative terminals also be connected together. If any of our readers have had similar trouble and have successfully overcome it we shall be glad to hear from them on the subject.—Ed.]

Simple Control for Business Vehicles.

Editor Horseless Age:

You set forth the matter of complicated control admirably in your editorial of March 25, and after reading this it will be plain to an ordinary observer that much remains to be done in the matter of simplifying controlling methods. Nine devices (eight mentioned by you and the steering) are certainly too many for handling any vehicle except in open country. It is no wonder that hired drivers are necessary, and expert ones at that. This condition cannot, however, continue. The motor vehicle must be made to meet the needs of the people. It must be made usable by any and every member of the family, ju horse is driven, and, therefore, the methods must be simplified. Thes should be apparent, and if apparent, facturers should supply the goods. suggestions for simplifying can rea carried out, and if the emergency b omitted, there will be a pedal for and brake, a lever for changing th a throttle and the steering—c enough things for one brain to about and to operate with two har two feet.

Why the emergency brake is t necessary is not apparent. Reliabl ing is certainly more of a necessi reliable braking, for a vehicle wi some time if the power is shut off cannot be depended upon to run given direction if the steering is order. If duplicate parts are need tainly duplicate steerings are most sary. Vehicles can be driven brakes, and driven safely, but they be driven without a steering gea principal objection to an em brake, however, is the fact that it used regularly, and in an emergenc a driver is rattled anyhow, he is l forget the existence of an em brake, or in the emergency he app regular brake, which, if it fails, h ized the time and leaves no long or opportunity to apply the em brake. The safest vehicle, it seems writer, is the one that has but one and that a good one, constantly in that it is applied second nature, an constantly used, its condition is known. Further, having no em brake to depend on, the necessity c ing the ordinary brake in order is r If, however, this should absolute the clutches can still be utilized to the vehicle, and they form an em brake always in hand and constant That vehicles may be handled un and all conditions with the four ling ararngements, viz., the peda and means for controlling the chang the throttle and the steering ge been proven by us for six seasons, is the arrangement we have been and we believe that the developn controlling devices is necessarily this simple number.

Charles E. Du

Automobiling in Cuba—Tire

Havana, Cuba, Marc

Editor Horseless Age:

Referring to my recent commun in which I advised tourists fr United States to bring their auto with them, I am glad to note th are several machines skimming o fine tropical roads at present, an sure that all those who have broug machines here will agree with me a pleasure of using an automobile in ical country, where a horse would

swer the purpose of a tourist on account of the great distances to be covered.

There is one thing I have observed in my experience here, and that is that tires do not last as long on the roads of Cuba as on the roads of the United States. We have been using Dunlop tires for the last six months, and one trouble I have had with these is the bursting of the outer shoe. It always has been a hard task for me to put them on the rim, and I know of other automobilists who have had the same trouble. Now to avoid this trouble, the iron tools used in putting the shoes on the rim should be greased with a little Albany grease, so that the edge will slip as soon as you put pressure on the tool. This will prevent the tool from cutting the edge of the shoe, and besides you can put the tire on much quicker. The idea involved is that the edge of the tire must not be cut, because if it is cut and the wire is exposed, the latter will begin to rust the first time it is exposed to moisture, and it is then only a short while until the tire is destroyed.

I have also found it a very good thing to grease the edges of the shoe, in order to preserve them from the continuous rains we have here in Cuba. One cannot get tires repaired here, and to be able to ride I must repair them myself. I had one of the outer shoes burst and repaired it by sewing it with rawhide lace, and it works first rate.

GEORGE J. TRAUTZ.

The Dust Nuisance.

Editor HORSELESS AGE:

I have been using a 10 horse power tonneau car of American make for about a year, and have a good deal of trouble, especially on the back seats, with dust. The carriage is a very comfortable one to ride in, but if I take any friends out, after they have ridden 10 or 12 miles they are all covered with dust, quite a thick coat.

I have been watching your journal for a long time, hoping to see the question discussed in it. It seems as though there should be some plan or device that would largely prevent this. Possibly you are already posted, or some of your readers may be. If so, I should be very glad to know what has been done.

C. R. HOAG.

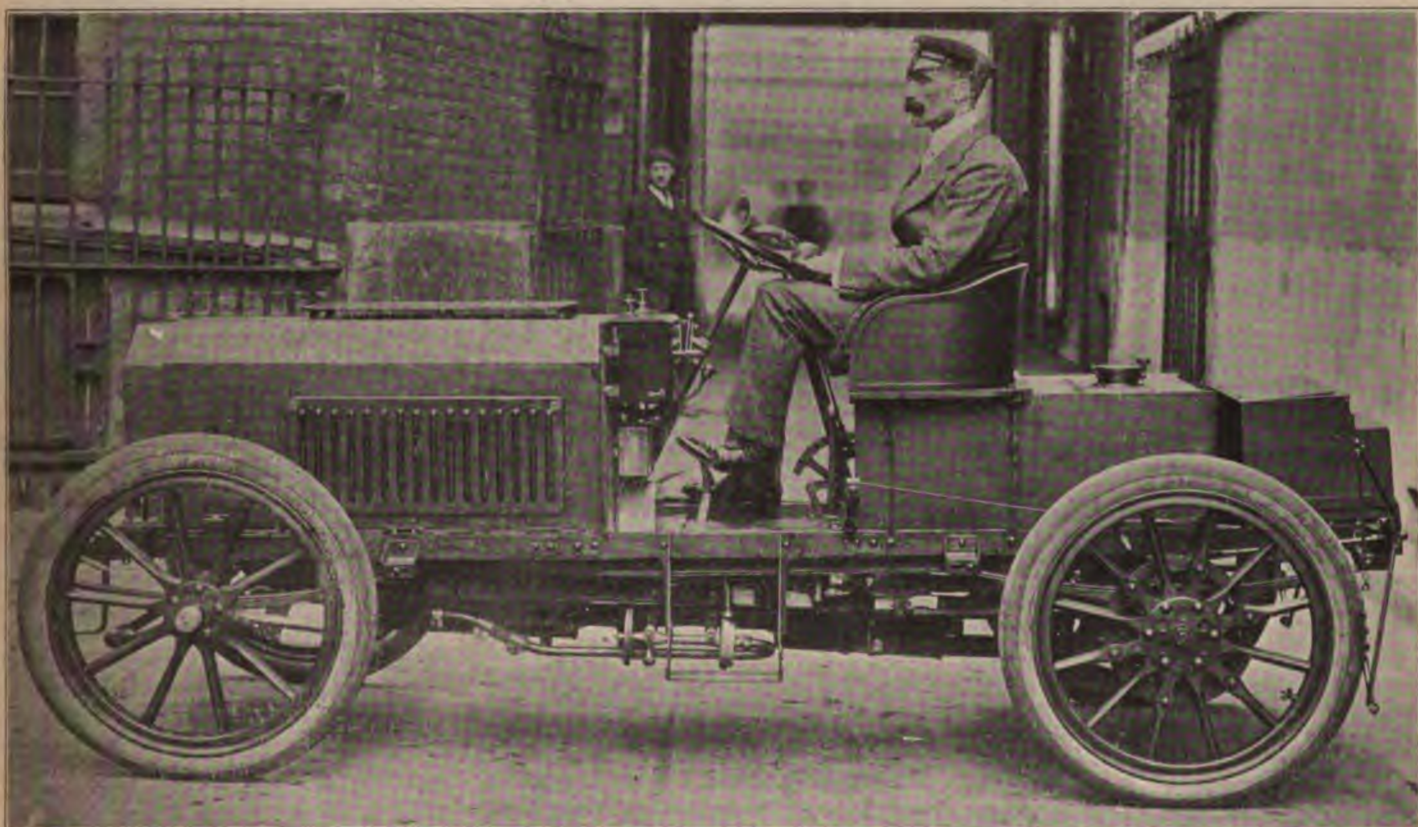
[The only means of partially overcoming the dust nuisance that we have heard of is to stretch a canvas screen across the back of the vehicle at an angle of 45 degrees. The canvas is fastened to iron rods rising from the seat back; it is 1 to 1½ foot wide and its lower edge is placed about 1 foot above the top of the seat back. When the vehicle is in motion the inclined screen causes a downward current of air behind the seat, which keeps down the rising current of dust laden air. The device is more suited to a surrey design of body than to a tonneau with rear entrance, but undoubtedly a method of hinging the screen could be devised, permitting of swinging it out of the way when entering the tonneau seat. —ED.]

We have a letter for Frank Williams, who had a communication on "Boiler Incrustation" in THE HORSELESS AGE of March 25, and shall be pleased to forward it to him if he will send us his address.

The Napier Cup Defender.

The photograph herewith shows S. F. Edge, last year's winner of the Gordon Bennett cup, on the first Napier cup defender built for 1903. The particulars of the car are in general the same as last year, it having direct drive on top speed and being built throughout with the idea of eliminating friction, thus making excessive horse power unnecessary and enabling it to climb practically all hills on the top speed. The weight of the car is 1,960 pounds, a little heavier than last year. The size of the wheels is the same, they being 34 inches in diameter, with 90 millimetre (3½ inch) tires. A very simple form of spring suspension is used, doing away with all the shackles.

A simpler form of clutch is used, which is said to be of such accuracy and delicacy that the car can crawl along at half a mile an hour quite comfortably. The clutch is self contained, so that no end thrust is thrown on the engine or gear box. The universal joints on the propeller shaft are enclosed in dust-proof cases.



S. F. EDGE IN THE FIRST NAPIER CUP DEFENDER.

...OUR... FOREIGN EXCHANGES

The Agricultural Hall Exhibition.

The eighth annual automobile show, held by Cordingley & Co. at the Agricultural Hall, Islington, London, opened its doors to the public on Saturday, March 21, and remained open till March 29. Like so many previous shows, it was characterized by incompleteness of many exhibits on the opening day. Many of the leading British manufacturers, members of the Motor Trades Association, did not exhibit, but the cars of some manufacturing members of the association were shown through agents. On the whole the agents or foreign element and also accessory exhibits were more prominent relatively than at the other London shows that have been held this winter. Notwithstanding the absence of some of the home manufacturers, the vast hall was well stocked with exhibits, and much effort had been expended in giving the naturally gloomy interior of the building an attractive appearance. A very effective scheme of general decoration was carried out by the show promoters, and electric lights were used to such an extent that the demand for current is said never to have been so great for show events. The total number of exhibitors was greater than last year, when the Agricultural Hall Show was the recognized trade show.

Quite a large exhibition of steam trucks was made in the Minor Hall, and the King Edward's Hall had been fitted up by the two exhibitors who had their spaces there as a comfortable lounging room for visitors. Commercial vehicles were exhibited by Messrs. Coulthard, Foden, the Lancashire Steam Motor Company, Mann's Patent Steam Car and Wagon Company, the Straker Steam Vehicle Company, A. W. Brightmore, Savage Brothers of King's Lynn, the Yorkshire Patent Steam Wagon Company and E. S. Hindley, of Bourton.

Many of the special attractions which had been expected failed to appear, and the more important exhibits were as a rule duplicates of exhibits which had appeared at one of the earlier London shows or the Paris Show. A number of new British built vehicles were shown, mostly of firms who have only recently entered the business. The list of these firms includes Horsfall & Bickham, of Manchester; Frank Morris, of King's Lynn; George Hurst, of Holloway; Suffield & Brown, of Willesden; the Ridley Autocar Company, of Coventry, and the Canterbury Motor Car Company.

The attendance at the show was very good, and the exhibition was generally pronounced a success. The dates for both the Crystal Palace and the Agricultural Hall shows for next year have already been fixed, and the promoters of the Earl's Court Show have just announced their intention of confining their next year's exhibition to cycles and motor cycles. Hence it appears that next year there will be two shows in London.

How to Wash Varnished Bodies.

There are still many automobilists who, although quite familiar with the mechanical parts of their car, have no idea of the care with which a wood body should be washed. Carriage varnish is a very sensitive material and suffers under the influence of light and heat, the surface becoming soft and dull. The car must therefore not be stored in a room where it is directly exposed to sun rays. The storage room should also be dry and well ventilated. It is undoubtedly preferable to cover the vehicle when stored away with a canvas cover. A newly varnished car should be left to dry several weeks before being used regularly, this period being required by the varnish to set thoroughly. To thoroughly harden the varnish and obtain a high polish, the body is washed with pure clear water, dried with buckskin and is then left standing in the open air. Under no circumstances must mud be allowed to dry on newly varnished bodies, as it would leave spots which eat into the varnish and are impossible to remove. When the body is washed the water must be poured liberally over all parts. The use of a hose giving a powerful jet is not to be recommended. Much better results are obtained by using a large sponge, which is drawn full of water and pressed out over the panels of the body, the water in running off carrying the dirt spots along. The water must not be allowed to dry (by evaporation) on the vehicle, as it may leave just as bad spots as street dirt. Varnished or light colored surfaces must never be treated with hot water or soap. Enameled leather fenders, tops or booths should always be washed with weak soap water, carefully dried and then polished with buckskin. But no gasoline or benzine should be used, as it softens the enamel in such manner that it becomes damaged in time and loses its polish.—*Automobil Welt.*

Automobiles and the English Elections.

The Rye election contest offered another example of the value of the motor car in election work, says the London *Daily Mail.* Indeed, it might almost be said that Dr. Hutchinson's was a motor car victory. The constituency is very wide, and a line drawn between its extremities would extend for 40 miles; the villages are scattered, and between them lies a sparsely peopled country; the railway serves only the principal places, and the roads are in many parts so hilly that carriages can only travel slowly.

But with the motor car all difficulties were overcome. The new member made light of an 80 mile canvassing tour in a single day, and at night the car whisked him from one spot to another, so that he frequently spoke at four or five meetings many miles apart between the hours of 7 and 10. And when he had made his last speech he boarded the car again and covered a dozen or 20 miles on the road to Hastings before bedtime.

This was his program on each of the fourteen days of the actual contest, and in that time he traveled at least 1,000 miles in the constituency, revisiting some of the districts many times.

His opponent was hardly less active, and also found the motor car of immense service. But toward the close many more cars were brought into the division, and at a modest computation the electioneering motors traversed 3,000 to 4,000 miles during the brief period of the struggle; and, as some of these cars had seats for eight persons, and there were several passengers on every journey, it is fair to assume that the distance traveled by all the persons engaged in election work during the fortnight was not less than 20,000 miles. With horses this would have been impossible.

Prof. H. S. Hele-Shaw has accepted the presidency of the Liverpool Motor Cycle Club.

Clarkson, Limited, has been incorporated at Chelmsford, England, with £1,000 capital to acquire the business of the Clarkson & Capel Steam Car Syndicate.

The Brush Electrical Engineering Company, of Loughborough, England, have a complete plant for making pressed steel frames, and are preparing to supply these frames to the automobile trade.

In a forecast of the Agricultural Hall show a writer in an English daily states: "An attractive exhibit is sure to be discovered in the New Mercedes, popularly known as the millionaire's car."

The winners in the muffler contest of the A. C. F. (some particulars of which we printed in last week's issue) have now been declared to be the following: First, Ossant muffler; second, De Retz; third, Arnaud, and fourth, Ravel.

In consequence of the accident to Count Zborowski, the prefect of the department on April 2 prohibited the further use of the Nice-La Turbie route for automobile races and revoked his permission for the mile race on the Boulevard des Anglais, Nice, scheduled for Sunday, April 5.

The crude oil production of the Baku (Russia) fields, for the first time since 1894, fell off last year, leaving 1901 the record year as far as the volume of production is concerned. The undoubted cause of the decline in the production was the overproduction of 1901. The result of this overproduction was a decline in the price of crude oil to a figure which was in many cases less than the amount to be paid the

nment as royalty on the territory—gure, almost the whole year through, ch the lessee of Government territory not work without considerable loss.

Automobile Club of France has 50,000 francs toward defraying the f the three days' fêtes to be held ne next, when on the first day lub have engaged the entire Paris for a gala night, a dinner taking on the second day at the clubhouse, e third being devoted to a run to inebleau Forest.

Queen of Queens in the Mi-Caréme n Paris this year held her triumphal sion in an electric car built by De & Bouton, with a body very sumptu-decorated in the style of the new art, artist Jambon. The Queen sat upon throne, a pair of swans setting off nt of the car, and a basket of flow-ng placed at her feet.

Association of German Automobile acturers at a meeting in Berlin on 9 resolved unanimously not to par-e in the proposed automobile exhibi-in Frankfort-on-the-Main, Leipsic Konigsberg. One or at most two per year is sufficient, and the asso-decided to hold another show in Flora" Building, Charlottenburg, in

annual contest of business vehicles, zed by *La France Automobile*, began day, March 22, a fuel consumption having been held the previous day the Lake d'Aumesnil in the Bois cennes. Although twenty-one vehi-d been entered in the contest, only competed in the consumption con-Bardon and a Peugeot truck and a let steam omnibus.

rding to the London *Globe* a gen-ndicate or trust is being organized the manufacturers of automobiles many with the purpose of achieving inant position for cars of German in the European markets. This l of organization has already been to every other German industry. lan embraces a system of bounties bates. There has been during the w months a huge increase in the r of German automobiles exported, lly to England.

erman motorist finds himself in a a. Passing through a small town r, at an hour of the night when the were empty, he omitted to sound l as the local regulations prescribe. after committing this crime he was with a summons for not sounding ng while crossing a public thorough-He protested, but in vain, and the s paid. Some weeks later he made the same journey at the same hour, and mindful of past misdeeds, loudly sounded the alarm at the cross roads. The result was the issue of a second summons, this time for causing "rest disturbing noise"!

The British Secretary of War has issued his approval of the following special grants being made to the Volunteer Motor Corps—now being raised—in lieu of all grants given to ordinary volunteer corps: A capitation grant of 40s. for each efficient officers, 40s. for each proficient member, 50s. for each proficient officer and sergeant, an allowance of 30s. a day —not exceeding ten days—for each day of attendance of any officer or volunteer on duty with his car, and where fuel is not obtainable from the stores of the army service corps a further allowance of 30s. a day, which is also to cover wear and tear of the machines.

John Scott Montagu, M. P., has informed the executive committee of the A. C. G. B. and I. of his desire to present a trophy (value 200 guineas) in connection with the race for the Gordon Bennett Cup. The suggestion at present is that the trophy should be held by the team of three cars, representing a nation, which may collectively make the highest average speed. A sub-committee, consisting of the Hon. John Scott Montagu, Sir David Salomons, Mark Mayhew, Paris Singer, Julian Orde and the representatives of France, Germany and America on the international commission, were invited to draw up rules affecting the proposed trophy.

Club Notes.

HUDSON COUNTY A. C. DOINGS.

The Hudson County Automobile Club, of New Jersey, took action at its last meeting on the question of speeding on the Hudson boulevard, the members pledging themselves to discontinue the practice and to use every effort to discourage others from driving their machines at a high rate of speed. Some time ago this matter was referred to W. E. Scarritt and A. R. Shattuck, of the Automobile Club of America, and letters were received from them in which promises were made that they would do all in their power to further the wishes of the Hudson County Club among New York owners.

The annual election of officers resulted as follows:

President, A. G. Evans; vice president, Dr. L. A. Opdyke; secretary and treasurer, F. Eveland; board of governors, G. E. Blakeslee, E. B. Kiersted, Dr. G. Wilkerson and G. Wilson. These committees were appointed:

Runs and Tours Committee—G. E. Blakeslee, D. W. Romaine, G. E. Wilson.

Good Roads—G. L. Record, W. C. Fisk, E. B. Kiersted.

House Committee—J. H. Edwards, C. Fisk, F. Englebrecht.

Auditing Committee—E. Yale, G. E. Long, J. A. Dear.

Membership Committee—E. B. Kiersted, G. E. Wilson, Dr. G. Wilkerson.

A committee appointed at the previous meeting to secure a new clubhouse reported that quarters could be secured at 2565 Boulevard, and it was decided to accept the location.

An automobile club with thirteen members has been organized at Auburn, N. Y.

The Belmont (Pa.) Automobile Club has applied to the Common Pleas Court for a charter.

Freeport, N. Y., automobilists are considering the formation of the Freeport Motor Carriage Club.

Julian C. Chase states that he has severed his connection as the New York sales manager of the Ward-Leonard Electric Company.

It is understood that the Automobile Club of Lawrence, Mass., will erect a large two story automobile station on Methuen street. The first floor will remain open, to provide a place for storage, and on the second floor it is planned to construct workshops for repairing, painting, etc.

The armory on Broadway and the first week in May have been decided as the place and time for holding the automobile show under the auspices of the Milwaukee Automobile Club. The club has the cooperation of the Wisconsin Association of Dealers and Manufacturers of Automobiles.

Jesse B. Cornwall has been nominated for the presidency of the Automobile Club of Bridgeport, Conn.; W. S. Teel, Jr., vice president; Thomas Fish, secretary; Frank T. Staples, treasurer, and Frank Miller, David F. Read, Bernard Setzer and F. I. Hitchcock as a board of governors.

The second meeting of the Marlboro (Mass.) Automobile Club was held on March 25. Officers were elected as follows: President, E. G. Hoitt; vice president, J. L. Harriman; secretary and treasurer, J. F. J. Otterson; executive committee, the president and secretary, ex-officio, A. C. Lamson, G. P. Keith, and E. H. Ellis. Red and white were adopted as the club colors, and a badge of these colors, bearing the words "Auto Club, Marlboro," was adopted; also a club flag, the shape to be swallowtail, the upper half red and the lower half white. A petition is to be presented to the Legislature, suggesting that the speed limit be raised to 12 and 20 miles per hour for city and country respectively, and providing for some means of registration and identification was generally signed. A number of new members were enrolled and others have signified their desire to join.

MINOR MENTION

George Spurr will open an automobile station at New Britain, Conn.

E. R. Braley, of Pasadena, Cal., is building a two story garage at a cost of $7,000.

Harry and Dean Cromwell are now managers of the Broadway Auto Storage Company, Los Angeles, Cal.

The capital stock of the Midgley Manufacturing Company, Columbus, Ohio, has been increased from $100,000 to $200,000.

The assets of the Munger Automobile Tire Company will be offered for sale during the month by the receiver, W. Holt Apgar.

The machinery of the C. J. Moore Manufacturing Company, Westfield, Mass., has been sold to a New York machine commission house.

It is said that a company of Jamestown capitalists are about to start an automobile plant and that they are looking for a site in Tonawanda, N. Y.

J. M. Swanson is organizing a company at Marathon, Ia., for the manufacture of automobiles. The company will be capitalized at $10,000.

A single shipment of thirty-six cars of automobiles, or 432 machines, is said to have been made to California last week by the Olds Motor Works.

The new catalogue of the A. L. Dyke Automobile Supply Company, St. Louis, will consist of 160 pages and will be ready for distribution about April 15.

The Martin Motor Company will run a line of express motors in Schenley Park, Pittsburg, Pa., and later on in Grant boulevard and other thoroughfares.

Representatives of the Ling Automobile Company, of Grand Rapids, have been talking with the business men of Battle Creek about the removal of the factory to that place.

The Morrisville (N. J.) automobile factory has been closed down and Mr. Hirschberger, head of the mechanical department, is quoted as saying that financial difficulties are the cause.

It is reported that an engineer from the De Dietrich automobile factory, Luneville, France, is now in the United States for the purpose of locating a site for the manufacture of the company's cars in this country.

Announcement is made by the Brooklyn (N. Y.) Automobile Company that they have taken over the entire plant of the Long Island Motor Company, of Brooklyn, and that they will open an office and salesrooms at 66 West Forty-third street, New York.

It is reported that Charles J. Glidden, of Boston, is planning to take his family in a motor car up through the Scandinavian peninsula to Trondhjem, within 2 degrees of the Arctic Circle. He will return through Sweden, Holland, Germany, Belgium, Switzerland and France to London, covering a total of 4,500 miles.

The Chicago Motor Vehicle Company is reported to have issued $150,000 bonds on its plant in Harvey, Ill.

The Graham-Fox Motor Company, New York, will remove from West Broadway to West Sixty-seventh street.

There are said to be seventy-five automobiles in Savannah, Ga., and all except three are propelled by gasoline.

Charles M. Hall and Ed. Kirk have formed a partnership to carry on the automobile business at Toledo, Ohio.

Bayless & Eagle, Davenport, Ia., will handle the Franklin, Cadillac, Northern and United States Long Distance automobiles.

One-half of a new building, which is being erected for Gus V. Brecht, of St. Louis, Mo., will be used for an automobile factory. The cost will be about $40,000.

Dr. Edwin Murray, of Minneapolis, Minn., recently left his automobile unlocked in front of the house, and when he returned in about a half an hour he found that it had been stolen.

The Electric Vehicle Company is about to place on the market its new underhung rear driven victoria, which is a modifications of its standard mark XIX gear. It has a new design of body.

Announcement is made that the A. Clement Cycle, Motor and Light Carriage Company will this fall enlarge its plant at Hartford, Conn. The company purposes to engage in the manufacture of automobiles.

J. C. Wettergreen, Hyde Park, Mass., writes that he has improved his auxiliary spark gap device by making the shield of hard black rubber and the standards to hold the glass tube of brass, with two neat binding posts on the standards.

The Walters Power Company have purchased the equipment and stock of the Holland Automobile Company of Jersey City, N. J., and will manufacture hydrocarbon motors of from 1 to 50 horse power, in single cylinder, double vertical, two cylinder horizontal opposed, triple and four cylinder construction.

A. J. M. Edwards, formerly with the Vehicle Equipment Company, has taken a position with the Electric Vehicle Company as salesman in the New York office. Arthur Lesser is another new acquisition to the selling force of the Electric Vehicle Company. He was formerly with the Salamandrine Boiler Company.

The rules and regulations for the Commercial Vehicle Test have been compiled and are now in the hands of the printer. They will be given out after the next meeting of the Automobile Club of America, when they will be adopted. This is to give the prospective participants sufficient time to study them, as the test is scheduled for May 20 and 21. The exact route has not yet been decided upon, but it is said that it will be in the busiest sections of the city, as well as through part of the country beyond the city limits.

Chas. E. Miller, of 97 Reade street, New York, is importing a non-tarnishing, oxidized horn for automobiles.

Frank Howell, receiver of the Dayton (Ohio) Motor Vehicle Company, is having built a gasoline automobile of his own designing.

The Canada Cycle and Motor Company, Limited, of Toronto, Canada, are reported to have completed arrangements for the extensive manufacture of electric vehicles.

The Hartford (Conn.) Council has decided to fit up three of the public water troughs with appliances for supplying gasoline and steam motor vehicles with water.

According to Secretary Unwin, of the N. A. A. M., about $17,000 worth of automobiles were exported to England last month. Other countries to which American autos were shipped during the month included the Hawaiian Islands.

The Packard Motor Car Company, of Warren, Ohio, will build their vehicles upon the order of customers with a double phaeton body with individual front seats, one of which is hinged at its side and is turned up to let the passengers enter the rear seat.

Chauffeurs' Association of America.

"The Chauffeurs' Association of America" has been granted a charter by the State of New York. It is made up of a number of chauffeurs of private owners, and is the direct result of a recent effort of all the chauffeurs of New York city, both public and private, to form an organization for mutual benefit. By the incorporation of this association the whole chauffeur question is made more complicated than ever, as the association takes in only operators of privately owned gasoline machines, and the public operators are up in arms and threaten to make the life of the corporation short and unhappy.

Early last month a number of the chauffeurs got together to form a club and at a meeting called it was decided that any organization effected should grade the members according to their mechanical ability and experience. The plan was to grade according to a test to be taken by all anxious to join the association. This was opposed by the public operators, as they knew that they would be placed in the lowest grade and the meeting broke up with bad feeling generally and a determination on both sides to prevail. Then the private operators got together, and, under the guidance of H. H. Hill, decided to form a corporation, and accordingly the papers were drawn up and sent to Albany. They were returned a few days ago, properly signed. The incorporators are Van Allen Soule, Charles Neal, Harry H. Hill, Samuel Brock and Fred Walsh.

LEGISLATIVE AND LEGAL.

ng on New York City License Ordinance.

aring was had before the Laws and tion Committee at the City Hall, ork city, on Friday, on an ordinance ced by Alderman Doull requiring nsing of operators of automobiles e. The argument for was made by roducer and against by Counsellor Niles.

Niles based his opposition upon the that no man would take out an au- le until he was competent to oper- without danger, and thought that a should prevail with the committee extent that it would report unfavor- pon the ordinance. Mr. Doull ar- at the passage of the ordinance was led by the public, and that in this ly could the duty of the aldermen charged. He recited a number of ts that have occurred lately, and pon the incompetence of public au- lists. He said that undoubtedly the ce would benefit the industry, as it give the public confidence in the es and their operators, and that this eradicate much of the prejudice automobiles. He also expressed nion that automobiles would even- solve the problem of rapid transit uld do much toward making cities . All these things, he said, would e industry, and he was most anx- encourage the trade.

Hampshire Automobile Bill.

ton Churchill has introduced an au- le bill in the New Hampshire Gen- urt. It provides that the speed shall ted to 15 miles an hour outside and s within cities, villages, etc.; that ed shall be reduced or the machine ped when passing a vehicle drawn by power upon signal of the driver; ere a road is not of sufficient width vehicles to pass each other in safe- t the automobile be halted at one hat upon approaching crossroads ning a corner where the length of s less than 100 yards the speed shall eased and a warning be given with or gong; that automobiles shall be d with two brakes, a locking device trol lever, efficient steering gear and r gongs; be tagged with the letters provided by the Secretary of State, number at least 3 inches high, and in a conspicuous place on the rear, t, unless otherwise registered, oper- hall procure a license from a town Violations are punishable by a fine ceeding $100 or imprisonment not ng ten days, or both.

The New Missouri Automobile Law.

On March 24 Governor Dockery signed the Senate automobile bill. It permits no greater speed in the operation of automobiles than 9 miles an hour, compels operators to yield the road to horse drawn vehicles, and imposes a license fee of $2 in every county where a machine is operated, and an additional $2 in all cities having license inspectors. For the Kansas City automobilists who want to go to Independence or Washington Park occasionally the tax would be $4, plus, of course, their vehicle tax of $5, making a total of $9, as against $2 for the man with the buggy. Two lamps are required, on which shall be painted numbers 3 inches long. A number corresponding to the number of the license must also be displayed in a conspicuous place.

Heavy penalties are fixed for violations, the minimum fine being $100, or one month in jail, and the maximum $1,000 and six months, or both fine and imprisonment.

Connecticut Automobile Bill.

The Connecticut Senate has concurred in the passage of an automobile bill. It provides that owners of automobiles shall register their automobiles with the Secretary of State, conspicuously display the initial letter of the State and the number of the certificate, each at least 3 inches high, upon the back of the machine, except upon those offered for general hire or owned by manufacturers or dealers, and not employed for their private business or use, or where owners who have complied with any similar law in regard to registration in force in any other State except as to the display of the initial letter of such State, and a penalty of not less than $5 nor more than $25 for violations. The act is to take effect two months after its passage.

Automobile Law of Maine.

The Maine Legislature has enacted a law for the regulation of motor vehicles. It was approved by the Governor on March 28. Its chief provisions are that speed shall be limited to 15 miles an hour upon any highway, and in any park, and within the built-up parts of cities and towns, to 8 miles an hour, the exact limit to be fixed by the proper officials thereof, except where an ordinance may be passed permitting a greater rate; racing is prohibited; operators shall upon request give signals by putting up the hand or other visible means from a person riding or driving a horse shall come to a stop and remain stationary until the horse or other animal shall have passed; bells or other appliances for giving notice of approach, which may be heard at a distance of 300 feet, shall be carried on all automobiles, and also a lighted lamp between one hour after sunset and one hour before sunrise; municipal officers may designate places dangerous for the meeting of automobiles and horses by erecting in a conspicuous place within 150 feet thereof a sign reading, "Automobiles, go slow," which places shall not be passed at a greater rate of speed than 4 miles an hour. Violations shall be punished by fines not exceeding $50, or by imprisonment not exceeding ten days.

Automobiles are said to be licensed at the rate of one a day at Cleveland, Ohio.

The mercantile license ordinance under consideration by the Atlantic City, N. J., council places a tax of $12 upon each automobile.

The substitute automobile bill, reported by the Judiciary Committee of the Wisconsin Legislature, has passed to its third reading.

Upon the advice of Corporation Counsel Duvall, of Washington, D. C., the commissioners have refused a permit to Miss Alice L. Riggs to erect a garage.

Michael Joyce, of Passaic, N. J., has brought suit for $20,000 against John W. Ferguson for damages sustained by being run down by defendant's automobile last summer.

Charles W. Jones, of Randolph, Mass., was held in $2,000 bonds in the police court on April 1, charged with causing the death of Charles F. Porter, who was struck by Jones' automobile.

It is reported that the authorities will not push the case against Herman Unger, of Newark, who recently appealed from a fine imposed for speeding his automobile through the village of Fanwood, N. J., late last summer.

An order of the police of Long Island City requires that automobiles using the ferries plying between Thirty-fourth street and James slip, New York, and that city shall take their place in the line instead of cutting into it as heretofore, and thereby delaying traffic.

A correspondent states that the New Hampshire Legislature has adjourned its session without passing a bill regulating the speed of automobiles. The speed in the country is thus unlimited, but in cities and towns is restricted to 5 miles an hour by an old statute passed generations ago.

What is reported to be the first arrest in Manchester, N. H., of a chauffeur for violation of the speed ordinance occurred in the case of Wilbur Y. Hadlock, on March 30. Mr. Hadlock claimed that he was simply demonstrating a machine, and was within the legal speed limit, but the judge fined him $5.

The Grim Automobile bill, amended to meet desires of the leading automobilists of Pennsylvania, was passed by the Senate on March 31, and will now go to the House, where no opposition is expected. As agreed to by the Senate, the bill limits the speed to 8 miles an hour within the corporate limits of cities, and outside the corporate limits to 1 mile in three minutes. Provided, that upon sharp curves, sharp declines, upon the immediate approach of any person or team, and at the

intersection of any cross road, the speed shall not exceed 1 mile in six minutes.

Two automobilists were fined $20 each at East Williston, N. Y., on March 28, for exceeding the automobile speed law.

The license board, of Worcester, Mass., has notified automobile dealers that hereafter they will not be allowed to keep gasoline, either in large or small quantities, upon their premises.

Mayor Henry C. Steeg, of Terre Haute, Ind., is in favor of taxing automobiles at the rate of $1 per horse power. The State Legislature has already passed a bill regulating the tax on automobiles.

The residents of Collinsville, Ga., have appealed to the chief of police for relief from violations of the speed audinance by automobilists, and he has given his men instructions to docket all persons who run automobiles faster than is permitted.

The hearing in the suit of the Electric Vehicle Company against Smith & Mabley, of New York, for infringement of patents, which was to have come up Monday last, was postponed. George R. Day, of the Electric Vehicle Company, denied the rumor that the suit had been settled.

N. A. A. M. Matters.

The regular monthly meeting of the executive committee was held at the association's headquarters, New York, on Wednesday, April 1.

The committee on chauffeurs reported progress and arranged to make a further report at the next meeting of the executive committee.

One new active member was elected.

The committee on the St. Louis Exposition reported that it would be necessary to arrange for a building for the use of commission automobiles at the Exposition. The question as to the amount of space required for such a building will be taken up further with the individual members of the association.

The important question ot getting lower freight rates and better classifications on automobiles was brought up and discussed, and a plan will be submitted to the members for consideration.

ATTITUDE OF THE ASSOCIATION OF LICENSED MANUFACTURERS TOWARD OUTSIDERS.

Many manufacturers of gasoline machines are inquiring what will be the probable action of the Association of Licensed Automobile Manufacturers in the case of a manufacturer who is not a member of the Association, but who uses some of the many patents controlled by the Association in connection with the Selden patent, and if action will be taken at once and in the case where a manufacturer is an applicant for membership in the association. Mr. Day, of the Electric Vehicle Company, settled these questions when he said that the patents were the same to the Association as its money, and that any manufacturer who used them in any way would have to pay, and in the case of a failure to pay legal prosecution would result. He also said that any reputable manufacturer would be elected to membership, but that in the meantime the use of patents by these would have to be paid for.

Gordon Bennett Contest Preparations.

Interest now centres chiefly in the elimination contest for choosing two members of the American team, Alexander Winton having already been decided upon as one of the three who will represent the Automobile Club of America in the Gordon Bennett race in Ireland. No information can be obtained as to the location of the course over which the trials will be held. The officials of the club keep this a secret for policy's sake, but there is a well founded impression that the course has already been selected, and that the contest will be in the East. All candidates for places on the team must report to the club on April 11, and the trial will be held within the following week. Those who will contest are Percy Owen, of New York; L. P. Mooers, of Cleveland; C. W. Matheson, of Grand Rapids, and H. S. Harkness, of New York.

There are some interested ones who profess to think that the trials will be held in the Middle West, and they base this belief upon the fact that the two Western cars that will be used have not yet been shipped East.

H. S. Harkness, of New York, expects to have the car he will use in the elimination contest for the Gordon Bennett race ready this week. He reports that so far it has given entire satisfaction, every part working as smoothly as possible. He is opposed to the idea of holding the trial on a track, as he thinks the conditions for the trial should be as nearly those prevailing in the actual race as possible.

A. C. A. Affairs.

The year book of the club for 1903 has just been issued. It is gotten up and bound in the same style as the previous year books and contains 75 pages of text. The club on February 28 had a total membership of 418, of which 346 were active and 72 associate members. Members at that date owned 542 automobiles and had 147 under order. The year book contains a full list of members of the club and a list of automobile clubs in this country and abroad. It is stated that when the amendments and changes in the automobile laws of New Jersey, New Hampshire, Massachusetts, Connecticut and Vermont, now pending, have been completed, the full text of these laws will be printed in pamphlet form and issued to members as a supplement to the year book.

The snowstorm of last Saturday caused the third postponement of the run to Lakewood. Only one of the members made the trip, Henry C. Cryder, who rode in a Moyea, and was disappointed that he did not meet anyone at the hotel. Owing to the third failure the club members are disgusted with their poor luck, and there is talk of giving up the idea of holding the run until much later in the season, if at all.

New Incorporations.

The Marr Autocar Company, Detroit, Mich.; capital, $100,000.

The Johnson Auto Speed Device Vehicle Company, Augusta Me.; capital, $500,000; I. L. Fairbanks, president, and J. Berry, treasurer.

The Automobile Company of New Jersey; capital, $100,000; incorporators, Harry H. Picking, Gardner W. Kimball and Charles A. Greene.

Mobile Rapid Transit Company, Irvington, N. Y.; capital, $100,000; directors, John Walker, Sr., John Brisben Walker and David S. Walker.

The Michigan Automobile and Carriage Company, Detroit, Mich.; to make automobiles, etc; stockholders, James H. Howick, Henry Wright, George Everhart, Frank Bryan and Don Waldeck.

The C. Rossler Manufacturing Company, Buffalo, N. Y., to manufacture automobiles; capital, $60,000; directors, Charles Rossler, Stanislaus S. Nowacki, Stanislaus S. Lipowicz, Charles Newton and Archie H. Newton.

The Hudson Auto Vehicle Company, Hudson, Mich.; to manufacture automobiles; directors, Chas. Kefuss, E. E. Cole, G. I. Thompson, Edward Frensdorf, W. W. Bennett, F. E. Hook, W. N. Derbyshire, O. R. Pierce, Roscoe Bean, E. H. Cogswell and Oren Howes.

Accidents.

In repairing the automobile of Geo. S. Hedden, of Morristown, N. J., recently, Victor Wise was overcome by the exhaust gases.

The automobile of Dr. Stuart McGuire, of Richmond, Va., caught fire on the street on March 15 and was considerably damaged.

W. E. Zborowski, of New York, was killed on April 1 in an automobile hill climbing contest between Nice and La Turbie, France.

Charles White, of New York, on March 27 looked for some disorder in his automobile in Central Park with a lighted match and set fire to it, with the result that it was entirely destroyed.

The automobile of Mrs. H. P. Wasson, of Indianapolis, Ind., was demolished on March 27 by being struck by a railroad train, but Mrs. Wasson and her daughter escaped serious injury by jumping.

The automobile of E. M. Byers, of Pittsburg, Pa., became unmanageable in Allegheny, on March 20, and crashed through the safety gates of the West Pennsylvania Railroad into a passing freight train and was wrecked, but Mr. Byers escaped serious injury by jumping.

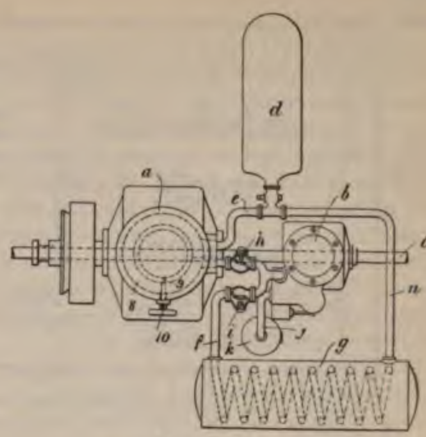
'OR VEHICLE
'ENTS..

United States Patents.

1. Connector for Accumulator
-George A. Washburn, of Cleve-
hio. March 24, 1903. Filed Octo-
902.
onnector consists of a back or body
to be disposed longitudinally with
er edges of adjacent cells, and rest-
on these edges. These backs are
d at their extremities with down-
projecting arms. In this manner a
or edge is formed, passing contin-
from end to end of the connector
nstituting the lower edge of the
s will readily be understood. At
wer extremities these arms are pro-
ith laterally projecting heads, hav-
tical openings corresponding with
es of the battery. The openings are
to receive the lugs of the pole
which project upward through them
ich may be secured thereto in any
manner.

6. Motor Propelled Vehicle.—F.
ichester, of Birmingham, England.
3, 1903. Filed July 12, 1902.
patent covers the application of the
ed air motor and compressor to an
bile, in conjunction with an ex-
engine.
power of the air motor is available
time when there is air pressure in
ervoir and the motor is intended
arly for starting, reversing and
n unusual amount of power is re-
An internal combustion motor *a*
auxiliary air motor *b* are both ar-
to drive onto the same shaft *c*. A
chamber or reservoir *d* is provided
ich air is compressed when the air
is used as a pump and from which
rawn when it is desired to start, re-
or assist the prime mover *a*. In
o prevent difficulties due to the for-
of ice in and around the air motor
, the air in passing from the reser-
the air motor is caused to pass
of a pipe *e* through a heater con-
with the exhaust or combustion
r of the internal combustion en-
nd in order to avoid the waste of
when the reservoir is being charged
on leaving the compressor by way
e *f* is cooled by passing it through
within a cooling water tank *g* or
ntaining the supply of combustible
When the air motor is changed by
er to act either as motor or pump,
npressed air will automatically take
per course, owing to the arrange-
f piping and employment of auto-
on-return valves *h* and *i* thereon.
tance, when the air motor is acting
ump air from the atmosphere is
through the pipe *j* (preferably through a casing *k*, filled with a drying material, such as calcium chloride) and delivered through a non-return valve *i*, pipe *f*, cooler *g* and pipe *n* to the reservoir *d*. When the air motor *b* is working as a motive power engine, the compressed air passes from the reservoir *d* by pipe *e* through the heater in connection with the internal combustion engine or prime mover *a*, past non-return valve *h* into the motor *b*, and thence through exhaust pipe *j* into the atmosphere. The automatic valves *h* and *i* may, if desired, be replaced by hand operated valves.

In order to enable stage compression to be adopted, and thereby to obtain the principal advantages of a compound engine without the necessity of employing multiple cylinders, an arrangement is adopted comprising a high pressure and a low pressure reservoir, a cooler for cooling the fluid delivered to either reservoir, a heater for heating the air delivered from either reservoir to the elastic fluid motor, such heater being in thermal connection with the cylinder, a valve chamber having distributing connections with the high and low pressure reservoirs, the motor and the atmosphere, and a distribution valve controlling said connections for enabling the elastic fluid to be delivered from compressor to low pressure reservoir, from low pressure reservoir through compressor to high pressure reservoir, from high pressure reservoir through fluid motor to low pressure reservoir, from low pressure reservoir through fluid motor to the atmosphere or from high pressure reservoir through fluid motor to atmosphere.



No. 722,116.

723,449. Electrode for Storage Batteries. —Thomas A. Edison, of Llewellyn Park, N. J. March 24, 1903. Filed November 28, 1902.

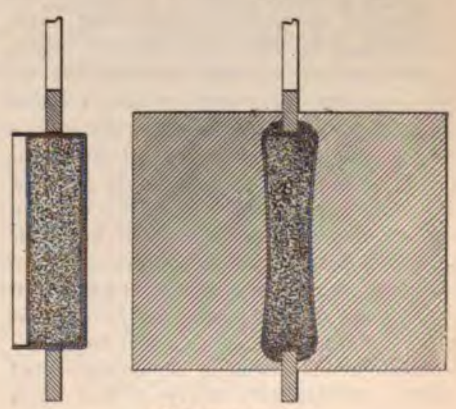
The inventor states that he has found in the use of his nickel iron cell that the active materials supported within sheet metal, nickel plated, perforated, corrugated pockets or receptacles crimped in position within openings formed in suitable plates or grids, when immersed in the electrolyte and subjected to a charging current, tend to objectionably bulge at the centre, so that the plates cannot be placed sufficiently close to each other, as is desirable where weight of electrolyte is sought to be reduced. By concaving the pockets or receptacles when the electrode is first assembled the swelling of the active material does not objectionably bulge the latter, whereby the objection noted is overcome, and it is to this feature that the invention principally relates.

The pockets or receptacles are concaved longitudinally, so that when any swelling of the active material takes place it will not objectionably bulge the pockets. This inward concaving or arching of the pockets also strengthens them somewhat to resist bulging strains, as will be obvious. The concaving and crimping of the pockets in place are effected by means of dies, which apply pressure to all the pockets of a single plate, so that a complete electrode will be formed by a single compressing operation. In practice it is found, however, that the best results are secured in the manufacture of corrugated pockets when two sets of dies are employed, one for effecting the crimping and concaving of the pockets and the other for effecting the corrugating thereof, since in this way the application of the first pressure tends to evenly distribute the active material within the pockets.

723,450. Reversible Galvanic Battery.—Thomas A. Edison, of Llewellyn Park, N. J. March 24, 1903. Filed November 28, 1902.

In another application the inventor describes an improved reversible galvanic battery employing in the make-up of its oxidizable element a metal or compound thereof which reduces with difficulty, such as electrolytically active finely divided iron, and wherein an easily reducible metal, like copper, mercury or silver, is added to the oxidizable active material, so as to thereby secure better electrical contact between the particles of the active material, and also to permit the cell to sustain a higher voltage throughout the entire period of discharge than would be the case if the readily reducible metal were not used.

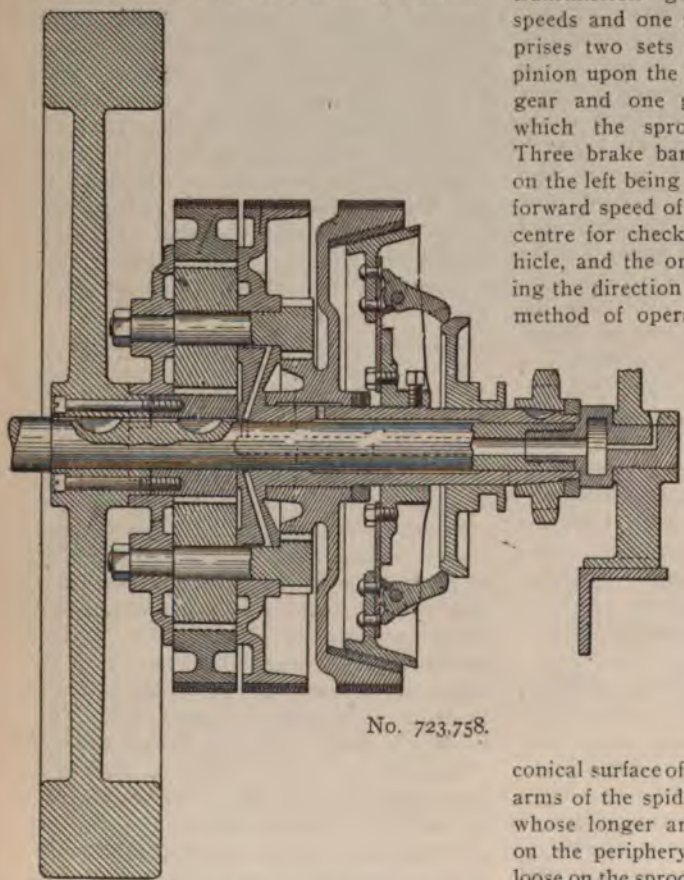
In the present application the inventor claims specifically mercury or a combination of mercury, and one or more other readily reducible metals, such as a combination of mercury and copper, as a suitable material for addition to the oxidizable



No. 723,449.

active material. Mercury when employed in connection with copper for addition to the active oxidizable material possesses an advantage over the use of copper alone, as it preserves the surface of the copper from oxidation, and it therefore permits of doing away with the use of flake graphite in the construction of the oxidizable electrode. At the same time the employment of mercury results in the production of a superior cell in the respect that it is capable of sustaining a high voltage throughout the entire period of discharge.

In putting the invention into practice electrolytically active finely divided iron is obtained by any well known process, and to the finely divided iron, and generally when the latter is in a moist condition, is added



No. 723,758.

a sufficient quantity of ammoniated copper and of precipitated oxide of mercury to produce as a final product a mixture composed of 64 per cent. of iron, 30 per cent. of copper and 6 per cent. of mercury. The addition of ammoniated copper and oxide of mercury to the electrolytically active iron results in the copper and mercury being immediately reduced to the metallic state by the reducing action of the iron, a portion of whose particles becomes oxidized, while at the same time the particles of metallic copper will be coated with an amalgam of mercury, so as to be better preserved from the effects of oxidation. In the reaction ammonia is liberated as a gas. As a result of this treatment the exterior of each active iron particle will be coated with a porous envelope of amalgamated copper in extremely finely divided form mixed with a small proportion of iron oxide. This mixture may be immediately molded into briquettes and used in a battery, and does not require the employment of flake graphite or other foliated conducting material, although of course the latter may be used. The employment of a mixture of copper and mercury, as explained, is superior to the use of copper alone. Mercury may be alone employed, but as so much of it would be required it is preferable to use mercury in connection with copper.

723,758. Power Transmitting Mechanism for Motor Vehicles.—Robert Symmonds, Jr., of Kenosha, Wis. March 24, 1903. Filed January 13, 1902.

This invention relates to a planetary transmission gear giving two forward speeds and one reverse. The device comprises two sets of planetary pinions, one pinion upon the driving shaft, one internal gear and one gear upon the sleeve, to which the sprocket pinion is fastened. Three brake bands are provided, the one on the left being used for securing the slow forward speed of the vehicle, the one in the centre for checking the motion of the vehicle, and the one on the right for reversing the direction of motion of the car. The method of operation of the gear will be plain from the drawing. The friction clutch embodies some novel features. It comprises a hollow outer cone journaled on the sprocket pinion sleeve and an inner cone secured to that sleeve. The inner clutch member comprises a spider, provided with spring spokes, secured to the annular conical clutch rim, having its outer conical surface mating the inner conical surface of the outer member. On the arms of the spider are pivoted cam levers, whose longer arms trend shaftward and rest on the periphery of a cam disk, which is loose on the sprocket sleeve and has a range of sliding movement longitudinally on said sleeve. The shorter arms of the levers bear against the outer end portion of the spring spokes or substantially against the back of the inner clutch member in such relation thereto as to crowd that member into frictional engagement with the outer member when the cam disk is moved on the sleeve toward the clutch. The hub of the cam disk is peripherally grooved to receive the fork arms of a shipping lever for actuating the cam disk laterally to engage and disengage the clutch.

719,818. Vehicle Wheel.—John S. Layton, Springfield, Ohio. February 3, 1903. Filed September 25, 1902.

719,578. Vehicle Wheel Brake.—William Fraser, of Dobbs Ferry, N. Y. February 3, 1903. Filed January 15, 1902.

720,253. Vehicle Wheel.—R. E. Jeffery, of Grass Valley, Cal. February 10, 1903. Filed October 27, 1902.

A wheel with wood spokes and metal rims, the spokes being set in sockets on the inner side of the rim and clamped between flanges at the hub, the same as artillery wheels.

Australian Patents.

(From Phillips, Ormonde & Co., 533 Collins street, Melbourne, Victoria.)

Improved Pulley Bearings for Motor Cycles.—J. Grummet, of Clive road, Auburn, Victoria. No. 19,966. In the State of Victoria.

A New or Improved Free Wheel and Variable Speed Gearing for Use in Connection with Velocipedes, Motor Cars and the Like, and for Other Purposes.—J. H. Braithwaite, St. Mary's Villa, Gawler road, Barnsley, County of Yorkshire, England. No. 20,014. In the State of Victoria.

An Improved Lining for Pneumatic Tires and Method of Preparing the Same. —J. J. Daily, 8 Armagh street, Christchurch, New Zealand. No. 20,053. In the State of Victoria.

Improvements in Driving Gear for Motor Cycles.—E. Waters, Jr., 414-418 Collins street, Melbourne (Com. by D. Macdonald, U. S. A.). No. 20,062. In the State of Victoria.

Improvements in Driving Gear for Motor Cycles.—A. Macdonald, Foster street, Parkside, South Australia. No. 12,744. In the State of New South Wales.

An Unpuncturable Pneumatic Tire Covering.—G. F. Brown, of Forest road, Thurstville, New South Wales. No. 4,114. In the State of Western Australia.

Improvements in or Relating to Pneumatic Tires.—C. Ray, Christchurch, New Zealand. No. 14,395. In the Colony of New Zealand.

Improvements in or Relating to Pneumatic Tires.—J. R. Brunt and R. C. Pitt, both of Christchurch, New Zealand. No. 14,408. In the Colony of New Zealand.

A composite Protecting Cover for Pneumatic Tire Air Tubes and Composite Pneumatic Tire.—C. D. Lightband, of 79 Armagh street, Christchurch, New Zealand. No. 15,495. In the Colony of New Zealand.

The Chauffeur Question.

The National Association of Automobile Manufacturers has appointed a committee to look into the question of how best to deal with chauffeurs of all kinds, consisting of Messrs. Deming, Landé and Gallaher, and similar committees will be appointed by the Automobile Club of America and the American Automobile Association. These committees will likely act in conjunction to stop the collection of commissions by the chauffeurs and to put a stop to them taking out the machines of their employers and doing public hacking, an abuse that is said to be growing daily.

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Notice to Advertisers.

Hereafter the first advertising form will be closed on Saturday and the second advertising form on Monday preceding the date of publication. Copy for new advertisements or changes of copy must be in our hands on or before Saturday in order to secure insertion in the succeeding number.

The Gordon Bennett Race and the Industry.

In connection with the road fund now being raised in England for the improvement of the Gordon Bennett race course it is observed by a daily paper that donations from members of the trade are a rarity, "which is rather surprising, as the race is being organized for the special benefit of the motor car industry." We know that this is the strain assumed by the organizers of the race and has been repeated in the daily and trade press times without number, but evidently the English automobile industry fail to see the matter in that light, as they have always been most liberal in supporting undertakings the beneficial influence of which on the industry as a whole was beyond question. That the cup last year was won by an English competitor was wholly unexpected and for that reason directed special attention to the English industry, but while the firm which built the cup racer has undoubtedly greatly benefited by the advertising thus gained, no particular benefits to the English industry as a whole are discernible. The English industry has not changed its relation to the French industry by this victory, French machines being imported into England in constantly increasing number, while German and American machines also find a constantly growing market there.

The growing danger of personal accident in these races makes them more of a menace to the industry than a benefit. Are such events as the Staten Island races and the recent La Turbie races calculated to stimulate the interest of prospective purchasers and to create a friendly feeling on the part of the public and of legislators? Certainly not. They can only strengthen the public conception of the automobile as a dangerous vehicle—a toy of the rich—and result in nothing but harm to the industry.

Special Machinery in Automobile Manufacture.

A large proportion of the men employed in the automobile industry are veterans of the bicycle industry and those branches of automobile manufacture which bear some relation to bicycle construction were the first to be brought to a basis of improved manufacturing methods. Wire wheels for automobiles, for instance, are turned out by the same perfected methods and by the same machinery as wheels for bicycles. As a result automobile wire wheels were early produced at a relatively low cost, which insured their extensive adoption, but time has shown this type of wheel to be less satisfactory for autos than for cycles. The same thing might be said of another inheritance from the bicycle industry—the tubular frame. Many conditions favored the adoption of tubular frames, particularly for light cars, notably the light weight secured, the perfection of brazing processes during the bicycle era and the fact that a large number of workmen were skilled in the brazing of tubular parts. But tubular frame construction, which was very conspicuous in earlier years, has now practically had its day in this country, so far as gasoline cars are concerned, although it is yet in some favor in England.

In the manufacture of such parts as these the methods and machinery of the declining bicycle industry could be adopted directly and cost of production thus be kept relatively low in comparison with results achieved in other lines of manufacture. But the greater number of parts of automobiles were subject to annual and even more fre-

quent changes, owing to the advancement of the art, and no great outlay for special machinery to produce these parts cheaply was advisable, as the saving in cost of production would not equal the extra cost of such special machinery in the short period during which there was no necessity for a change in design.

These conditions are now rapidly changing and the tendency toward standardization is everywhere manifest, the movement being led by the N. A. A. M., which has already standardized tire lugs and lamp brackets and contemplates dealing with other parts in the near future. A number of leading manufacturers of gasoline vehicles have made only slight changes in design since last season. When a vehicle has reached such a stage that no appreciable changes in design are necessary in years, the time is ripe for the introduction of labor saving machine tools, jigs and dies, in the manufacturing establishment. As examples of such labor saving machine tools may be mentioned multiple drills for drilling all the holes for the cylinder joint with the crank case in one operation, lathes with attachments for cutting cams automatically, etc. At present twin cylinders are generally bored separately, but it seems that if a considerable number of one size were required a boring machine to bore both cylinders at the same time could easily be constructed and be used to advantage.

Great development is to be expected along this line in the next few years, and in this development the machine tool builders will co-operate with the automobile builders. The signs are not wanting that the interest of machine tool builders in the automobile industry is growing, an interest which is fully warranted by the outlook.

Interstate Recognition of Registration Certificates.

Since it is now generally recognized that a Federal automobile law is an impossibility the most practicable plan by which automobile touring may be freed from the restrictions arising from varying legislative requirements in the different States would be to exempt from registration and compliance with the rules relating to identification numbers or initials those automobilists who travel only temporarily in a State, provided they can show that they have complied with the requirements in their home State.

The automobile ordinance adopted in Philadelphia last summer made an exemption of tourists who stayed in the city only a certain specified time, and the ordinance in force in Cleveland, Ohio, we believe, contains a similar provision. But none of the State laws now in operation or under consideration makes this exception. The New York law does not specifically refer to non-residents traveling in the State, but it is generally understood that they are required to register, and among the names upon the list of the Secretary of State at Albany are many automobilists residing in other States.

The New Jersey law definitely states that "every resident of this State who is the owner of a motor vehicle, and every non-resident owner whose motor vehicle shall be driven into this State, shall file," etc. If the initials of the automobilist's home State were added to the registration number or his own initials on his identification plate all necessity for registering in a State in which the machine is operated temporarily during a tour only would be obviated. Perhaps such a measure cannot be secured until all of the States have fairly uniform regulations, which will not be realized for a considerable time to come, but it must be regarded as a very desirable feature of an automoible law, as there would be little objection to adding the State initials to the registration numbers on the car and a great advantage in being able to make a long tour without registering in all of the States passed through and without providing oneself with a different number or identification plate for each State.

The Real Touring Car.

The touring car, as its name implies, is a car specially designed for country touring, but how many of the machines now offered to the public as touring cars fairly satisfy the special demands made on such a car as compared with a car for short trips and for town use only? When a long tour is made in an automobile the daily trips are longer and the average speed is generally higher than in ordinary pleasure runs, and to avoid any discomfort of the tourists the seats must therefore be particularly roomy and comfortably upholstered, and special means must be provided for protection from the inclemencies of the weather, mud thrown off by the wheels, etc. Unusual road difficulties are frequently encountered in touring, and a touring car must be of relatively higher power than a runabout for town use; but the majority of the better known touring cars leave nothing to be desired as regards power so long as the engines are in good order.

Where the present touring car is more or less defective is that it does not provide room for the many things usually carried along on a tour. With many automobilists an extra tire or outer cover is one of the most essential extra parts to be carried, and at present the only manner of carrying the tire is to strap it either to the front or rear of the body, where it is rather too conspicuous to suit the taste of the æsthetic user. It is a makeshift arrangement, which may be excusable with a car intended for town work, and which is only exceptionally used for country touring, but the necessity of it is inexcusable in a real touring car.

In France numbers of touring cars have been built with a Limousine body, the top of which is surrounded with an iron railing to serve for carrying extra tires and luggage. This arrangement provides a fairly suitable and inconspicuous place for the tires. In cars with ordinary tonneau or single seated body the best place for the tires undoubtedly is beneath the floor of the body in the rear, provided that space is not occupied by some other part, as, for instance, the muffler or the water tank. A drawer beneath the floor of the car could easily be made to accommodate an outer cover and a number of spare tubes, and if a rear step should interfere with drawing it out, the tires could be placed in a box of drawer form hinged to the body, the rear end of which could be let down to remove the contents.

Owing to the impossibility of carrying suit cases, etc., on some cars, it is not uncommon for tourists to ship a trunk along by express, but it is hardly necessary to say that this method is far from being ideal. The luggage question for touring cars can be solved in two different ways—viz., the body of the vehicle may be provided with compartments for storing the various articles it is desired to carry along, or provision may be made for strapping a neatly fitting trunk, readily removable. The latter would really seem to be the preferable plan, as it would allow of the trunk being carried into hotels at stopping places and would leave all the room of body compartments for extra parts and tools, which must be carried in considerable number on long trips.

ie features would certainly be valu- a car specially intended for tour- it in case a car is used only a week rteen days annually for touring, and rest of the year for short trips in inity of the owner's home, it is of self evident that the local use have greater influence on the de- an the exceptional use as a touring

Question of Automobile Road Racing.

disastrous termination of the Nice- rbie hill climbing race brings again cuously to the fore the question of ect of automobile road races.

he time of the Staten Island races ar, which ended in several fatalities, k occasion to express ourselves very y against such races, and the pres- se again proves the truth of the nts then advanced. Since the vehi- ed in these races are built specially m, and develop much higher speed permissible in common road traffic, aces can teach practically no useful regarding the construction of vehi- r common usage, and are therefore any practical purpose. In the early of the movement, when the vehicles were intended to be manufactured mmon public use, and when the attained did not exceed the limits ced by law, the road race presented y different aspect. Success then de- more on endurance qualities than igh speed ability, and the race dem- ed the practical value for road use vehicles competing.

ll this changed when the speeds at- began to exceed what is safe in com- affic and when special racing ma- were built. At this point road rac- uld have been discontinued and a ractical form of contests substituted. lso a new element entered into road rendering it positively objectionable very standpoint—the danger of per- ccident.

e early contests, the *Petit Journal* d the *Times-Herald* race, the vehi- e very crudely constructed and full tural weaknesses, but though there echanical breakdowns galore, no personal accident was recorded. cidents came, however, with the in- n speed and increased in seriousness e rates of speeds attained. In 1899 a foreman of the Panhard factory lost his life in testing a racing machine; in 1900 a contestant in the La Turbie race was killed, and since 1901 there has not been a single big racing event in connection with which no fatalities have occurred.

But even more dangerous than the races themselves is the use of the specially built racing monsters by private owners into whose hands they pass after having achieved their triumphs in the races. The fatal accidents to Baron von Bleichroeder, Millionaire Fair and quite a number of other wealthy people, who are the only class that can afford to buy such machines, are sufficient evidence of this danger.

If the chief or only object of the automobile was to furnish a means of exciting sport for the leisure class, then road races might be necessary to insure its continued popularity, but it has never been disputed that the future of automobilism depends upon the practical services it may render as a means of commercial goods and personal transportation. Success in this line can only be insured by developing the practical qualities of the machines, and can only be retarded by road races with their increasing danger to life and limb and the diversion of capital and talent to ephemeral ends. The road race is approaching more and more to that class of public events, of which the Spanish bull fight is a good example, which appeal only to those of brutal instincts. Every fatality caused by an automobile will only strengthen the public's conception of it as a deadly vehicle, and what is more serious, it will strengthen the foundation for this conception.

There will, of course, always be personal accidents with automobiles, as there are with horses or with other classes of machinery of the same nature, but it is squarely opposed to the interests of the industry to invite accidents by building vehicles which are inherently dangerous owing to their speed capabilities and devoid of all practical qualities, and it is discouraging to note that all the energies of the clubs, in Europe at least, seem to be directed toward organizing contests of this kind.

In this country so far there have been only two real road races, both over short distances. In one of these a serious accident was narrowly avoided, and the other ended in dire disaster. Most of the State laws now being adopted preclude the possibility of road races in future, and it is to be hoped that another race may never be seen on our public highways. Any organization which should now attempt to promote such a race, instead of benefiting the industry, would run the risk of doing it irreparable injury. Road racing, if persisted in, is certain to prove the doom of the automobile industry.

Two Important Questions of the Future in Connection with Gasoline Automobiles.

By Albert L. Clough.

It is an easy and safe process to view in retrospect the automobile development of a season and to point out its tendencies, its lines of progress, or its lines of weakness. Far more difficult it is to take a look forward and, guided by a few signs of the times, suggest even roughly what are likely to be the burning questions in the automobile world in 1904. "Hindsight" ever is and will be better than "foresight."

Some points of design seem to be pretty well settled, perhaps, for some time to come. Suspension wheels have practically disappeared in favor of the artillery or tubular type. The long wheel base has come to be recognized and universally adopted as a prime condition of easy riding, the under frame has been discarded and flexibility of running gear admitted as a prime necessity. The runabout and the touring car have been sharply differentiated and representatives of each class approach more nearly than ever before to a standard specification. These are only a very few of the points which seem to have been settled for the present.

It is among the features of design which are most under discussion and in which most diversity of practice is at present shown, that the interest of the future is likely to be found. These points will perhaps constitute the burning questions of next year.

Two of these questions I venture to suggest as likely to engross the attention of the manufacturers and of the frequenters of the garage and club in the near future. These are, "What cooling system is to be preferred" and "Are two cycle or four cycle engines to be favored?" I realize that the broaching of this latter question is rank heresy in the minds of many.

The history of motor cooling systems, as applied to automobiles, is of considerable interest. As is well known, the air cooled motor was introduced very early in the history of the art and furnished the motive power for the tricycles, quads and voiturettes, which were the indispensable forerunners of the full fledged motor cars. These motors may be typified by the De Dion engine of the flanged type. These served very well in the smaller sizes, but when more powerful vehicles were called for and motors of larger bore became necessary the limiting size was soon reached and passed. The fact that the energy dissipated in the

cylinder increases as the square of the bore, while the radiative and convective ability of the cylinder increases only as the first power of the bore, imposes such discouraging conditions that it is no wonder that in the absence of much experience in multi-cylinder construction, air cooling was abandoned in favor of water circulation.

The earlier American cars employed gravity circulation from a tank which was sometimes corrugated or filled with air flues. Sometimes these tanks were very unfavorably placed in regard to disposing of their heat—in one well known instance the tank was carried in the rear of the body in close proximity to the hot engine and the air flues were not so numerous or so directed as to catch much cool air. The flues were, however, numerous enough when the proneness to develop leaks was considered.

Owing to unduly contracted portions of the circulating system, its lack of sufficient radiative and convective surface, and the bad disposition of the tanks, the circulation proved too sluggish and the dissipating power of the apparatus too small to meet the public demand as to water economy. Some makers adopted centrifugal pumps to insure a rapid circulation, and did not increase their radiating surface, but almost immediately the flanged pipe radiator, carried in the extreme front of the car, became almost universally adopted, and this in connection with a good pump met the demand for water economy for some time. But water economy had become a mania with some designers, and the reduction of the weight of cooling water to a minimum had become a desideratum of exponents of the speed craze, so they proceeded to "pile on the agony" by replacing the pipe radiator by a cellular or honeycomb radiator, and adding an air fan arranged to assist nature in maintaining the air circulation over the heated surfaces.

Meanwhile, some manufacturers who did not fancy the circulating pump, began to try to eliminate its *raison d'etre*. Realizing that too much friction and too little exposed surface were the defects of the gravity system, they developed a radiator, consisting of vertical flanged pipes arranged in parallel, which provided a large cooling surface without contraction and called it the thermo-siphon system.

It is a principle in invention that no idea which is founded in reason is ever wholly discarded. It merely lies in abeyance for a time, awaiting the circumstances which shall insure its further development. Thus, air cooling was not given up. It became apparent that circular corrugations upon the cylinder did not offer the maximum of effective emissive surface, and we find the dissipating surface very largely increased by a construction which involves the studding of the whole cylinder with a very large number of grooved metal pins. In some instances, corrugations extending lengthwise of the cylinder have been adopted as preferable to those of the annular form as offering improved opportunity for convection. With improvements in multi-cylinder construction and the popularization of this type, air cooled engines of quite large capacity have been developed, having cylinders of nearly the limiting bore as determined by conditions of heat dissipation, and two, three or four in number.

At recent shows there has been much interest expressed in air cooled motors, and the automobile journals frequently contain inquiries for vehicles employing such motors, especially from the class of people who use or hope to use automobiles for business purposes. There seems to be a widespread interest in air cooling and an increased faith in its efficacy. It will be interesting to note how far this tendency toward air cooling will go in coming seasons. Already cylinders developing 8 brake horse power have been successfully air cooled in practice, and by a multiple arrangement of cylinders of such size very large horse powers might be attained.

Herbert Spencer states in his "First Principles" that progress in invention is through the heterogeneous to the homogeneous. As a rule, an idea is first embodied in an apparatus of crude simplicity; then this idea is expressed in more complicated form, making use of somewhat inharmonious and imperfectly related parts, and at last the idea finds final expression in a relative simplicity and harmonious relation of parts from which the original crudity has been refined away by good design, due to an understanding of the conditions.

It may be that we are seeing the "heterogeneous" stage of cooling systems in late designs, which comprise a water pump, an air fan and a radiator of most complex and expensive form, and it may also be that air cooling (which is simplicity itself) will, when worked out by the light which we now have, prove the ultimate method, as far at least as vehicles of utility are concerned.

THE TWO CYCLE ENGINE.

While engines operating upon the Otto or four stroke cycle have, until very recently, held undisputed sway in automobile practice, the two cycle motor, which has long been the accepted type in marine practice, has of late appeared upon the field. So important has its entrance appeared to many well informed people that its future is watched with extreme interest. Perhaps the development of gas engines, of the two cycle type, for stationary purposes, has caused the public to attach special significance to its invasion of the automobile field. Certainly its achievements as a stationary prime mover are most remarkable. Engines of as high capacity as 1,200 and 1,600 horse power have been produced by the Korting Works, and are in regular operation upon the two cycle principle. Engines of 2,000 horse power will be contracted for by this concern. These engines are double acting, and thus every stroke is a power stroke. The charge of air is compressed in a separate cylinder, and the fuel introduced late in the compression stroke in order to obviate pre-ignition. Scavenging of the working cylinder is provided for by the introduction of an excess of air.

It would seem that if engines operating upon the two cycle principle are susceptible of development, as extensive as it appears these large stationary engines have received, that they may have to be reckoned with in the automobile field.

The two cycle engine, as we know it in marine practice, is comparatively limited as to its speed range, and its charge is always somewhat fouled by the presence of burnt gases remaining from the previous explosion. The former objection arises partly from contracted ports and passages which, while ample to allow the slight range of speed demanded in marine use, would not do in automobile work. That a very considerable speed range can be obtained through correct design is a conclusion to which one must be forced by an examination of the performance of two cycle automobiles. The later objection is, it would seem, rather less important in practice than it sounds.

The two cycle cylinder gives one power stroke each revolution, while the four cycle cylinder skips each alternate revolution, so far as power production is concerned. The two cycle engine employs none but automatic valves, and dispenses entirely with valve gear. A two cylinder two cycle engine corresponds, as far as power distribution is concerned, to a four cylinder four cycle motor. Hardly anyone would dare to hazard a statement at present, as to the relative weight efficiency of the two types, and it is equally unsafe to state dogmatically how much or how little the speed of the two cycle motor may be increased, by correct design, without an undue loss of power. In fact little is known of the theory of the two cycle engine (the action of which is somewhat more obscure than that of the four cycle type), and it has received much less careful development than has its more orthodox rival.

It is a pretty safe principle that any device which has certain inherent advantages, even when these are coupled with disadvantages, is likely to find a field of usefulness. The disadvantages may very probably be minimized by correct design or the introduction of some new idea, if they are not inherent. The two cycle engine having the advantage of practical valvelessness and a double number of impulses per cylinder inherent in it, and disadvantages which are not known to be irremediable, is pretty likely to be worked at and improved until the utmost it is capable of is attained.

The presence of bearings in a chamber, which is relied upon for carrying compression, is admittedly a bad idea, and

pe of two cycle engine which s this construction may not be ne suitable for automobile work. er, there are other means of secur- same end, and, while they may in- additional complication, it may not sufficient in degree to counterbal- he advantages which it is sought to

e Ideals in Automobile Construction.

By J. S. V. Bickford.

ay be interesting to inquire in what on the science of automobile con- on is moving, for if it is only pos- determine toward what results we iving and whether these results are can be desired much useless work saved.

t, then, is the ideal automobile? I mean a hopeless ideal, but the ideal ctical engineering. I think it will nd to be something as follows: It be practically certain not to break given fair usage. It must be cap- being operated with certainty and That is to say, the whole of the and direction control gear should prised in three handles, or possibly Any attentions which the machinery s in operation should either be au- ally performed or means should vided by which the machinery may its wants known, yet these means e so simple that a failure is only a contingency. On such an auto- a man might drive and converse friend, giving no more attention to r than he would to a bicycle. To ny meaning clear, suppose my ideal s a steam one, then neither burner iler would require attention, or if ter was not automatically fed at must be provided with a reliable ter alarm. Now, let us see where conditions will lead us as applied to ee types of motive power at present le.

ELECTRICITY.

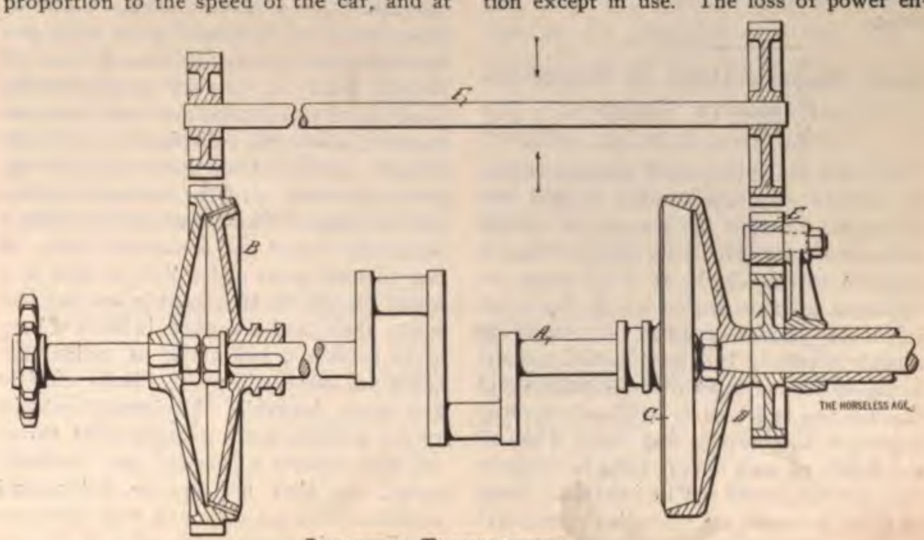
of course, fulfills the whole of the ons if sufficient storage capacity provided for the maximum run to n in a day. What this is to be will on the circumstances of each indi- case, and I would pause here to ex- doubt whether in the future the on-stop distances will be run as to- n the old days of solid tire cycles ten went in for 100 mile runs in this y, but it is a very uncommon thing ys to hear of anyone doing even cept on tour, and then it is rare. uth is that for anyone but a trained anything over 50 miles is a bit extra effort, and now that the nov- the thing has worn off people have ucement to put forth this extra ef- nd in consequence runs are short- In my opinion this will also hap- the case of the automobile. There is comparatively little real pleasure in running an automobile four or five hours without a stop. It is cramping and trying work, not pleasure, and I believe will go out of fashion as people wear the novelty off the pastime. I should be inclined to say that ultimately few people will care to take a run of more than 2 to 2½ hours without a stop. If we assume the speed at from 20 to 25 miles per hour we shall probably not be very far out, and this gives a non-stop run of from 40 to 60 miles, or, say, a day's run of 120 miles. We may therefore allow that our ideal car should run, to allow for contingencies, a maximum distance of 150 miles without taking supplies.

It would seem that this condition would at once rule the electric automobile out of the contest, for though these cars have been run distances in excess of 150 miles on one charge, yet the occasions have been so rare that they may be considered as experiments only. Not only that; we are given to understand that the maintenance charges of the batteries after the first year are very heavy. Of course if anyone comes along with a storage battery which will give about 4 brake horse power for, say, seven or eight hours on a weight of, say, 5 hundredweight, and without excessive wear, the problem is about solved, but so far this has not turned up.

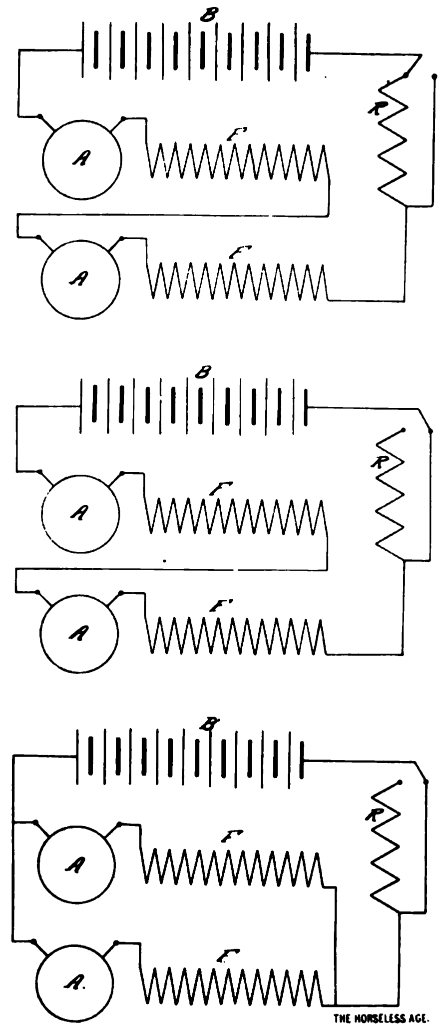
THE GASOLINE CAR.

Are the conditions suggested possible with an internal combustion engine? Obviously nothing in the nature of a change speed device is possible, and the engine must be capable of driving its car up any hill likely to be met with on its one and only gear. Incidentally it may be mentioned that this entails a very powerful engine if moderate speeds of rotation are to be adhered to. Thus suppose we take 500 revolutions as the normal speed of the ideal automobile engine for the sake of argument. This engine will take the car up a hill of one in five at, say, 5 miles per hour. But as the engine is rigidly geared to the car the speed of rotation, and with it the engine power, augments exactly in proportion to the speed of the car, and at speeds below 15 miles per hour it is probable, with pneumatic tires, that the resistance does not augment greatly with the speed, so that there is no reason why our car should not climb a hill of one in seven at about 20 miles per hour, the power of the engine increasing in the same proportion as the demand for power. This means that such a car as I am describing would, if it weighed 2,000 pounds loaded, have an engine capable of developing about 17 brake horse power on the wheels at a speed of 50 per cent. above normal, which at once precludes the possibility of building a cheap car on these lines. There is a further difficulty. How is the gearless car to be reversed. It seems at first sight that it is absolutely essential to introduce gearing for this purpose, and this would at once fall outside the initial conditions assumed. We will return to this point later and discuss the possibility of building a self starting and reversing gasoline motor, and we will now pass on to the conditions obtaining, assuming the reversing problem to have been solved.

To run such a car we should first start the engine in the ordinary way, and having mounted to our seat we should gently move the brake lever so as to throw the clutch into operation, the clutch, which would only occasionally be required, being operated by the brake lever. We should then proceed to drive the car on the throttle lever, the carburetor being "automatic" on the Krebs or other system, as described recently in The Horseless Age. It would then appear that we should be able to control all motions of our car with the three levers, so long as we required only to move ahead. I believe that, granted a reliable engine, ignition, etc., that these conditions give us a nearly ideal car for ahead motion, but we always come back to this "snag." Reversing gear is absolutely necessary for the ideal car. Is it permissible to introduce more levers for reversing purposes? Permissible or not, I am afraid that it is absolutely necessary. One condition that I consider as a sine qua non is that any gearing used for reversing should not be in motion except in use. The loss of power en-



Suggested Transmission.



FIGS. 5, 6 AND 7.

of the battery being now connected in series, which again doubles the electro-motive force applied to the motor, and in consequence also the speed of the motor and car. In Fig. 4 the two halves of the field winding are connected in parallel. Only one-half of the current, therefore, flows through each of the field coils, and the weakening of the magnetic field resulting therefrom causes the motor to run faster, provided the load upon it is not too great. The first three speeds of this system of control therefore bear to each other the ratios 1, 2 and 4, and the fourth speed may be from 20 to 25 per cent. higher than the third speed. The maximum torque is obtained with the connection of the third speed, and it is not advisable to use the fourth speed with this system of control unless the going is fairly easy.

There are certain objections to paralleling the battery, and quite a number of manufacturers of electric vehicles for this reason accomplish their speed control by other means. If a cell should short circuit no harm would be done to any of the rest of the cells if all of them were connected in series; but if there are several rows of cells connected in parallel and a cell in one of these rows becomes short circuited the battery becomes unbalanced, some rows discharging much more rapidly than the one with the short circuited cell.

A system of control for a double motor equipment in which all the cells of the battery remain always in series is illustrated in Figs. 5, 6 and 7. For the first forward speed the two motors are connected in series with each other, and a resistance coil R is connected in the battery circuit which cuts down the electro-motive force. It will be obvious that when two motors are connected in series across the battery terminals, each of them has applied to it only one-half the electro-motive force of the battery. As the electro-motive force of the battery is cut down by the resistance R, the motors in this case are started with a very low electro-motive force applied to them. In Fig. 6, which represents the connection for the second speed, the resistance R is cut out of circuit, the connections remaining otherwise the same. In Fig. 7 the two motors are connected in parallel, and thus receive the full electro-motive force of the battery, which gives the third forward speed. An intermediate speed between those of Figs. 6 and 7 may be obtained by connecting the motors in parallel and the resistance R into the battery circuit, and a speed still higher than that of Fig. 7 may be secured by paralleling the two halves of the field winding of each motor.

Controllers are made with two different kinds of contacts, knife contacts and brush contacts. The contacts always consist of two parts, a stationary part and a movable part. The stationary parts are insulatingly supported on the frame of the controller, and are connected by wire cables to the battery and motor terminals. The movable contacts are supported on a rotary drum of insulating material. The two kinds of contacts are illustrated in Figs. 8 and 9, the former representing a knife contact and the latter a brush contact. In Fig. 8 A is the controller drum, to which is screwed the contact blade B of brass or bronze, forming the movable part of the contact. The stationary part is constituted by the two strips C C of spring copper, which are bent together at the upper end and riveted to the block D at their lower end. The block D is formed with a projecting stud, by means of which it is clamped or bolted to the wood bar E, which forms part of the controller frame.

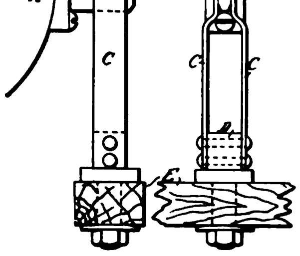


FIG. 8

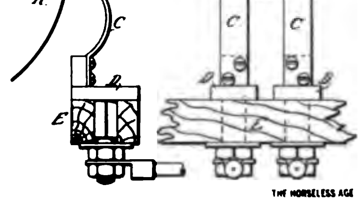


FIG. 9.

In Fig. 9 A again represents the controller drum and B the movable contact part, which here takes the form of a strip of metal screwed to the surface of the drum. The stationary contact part consists of a contact shoe F at the free end of a flat spring C, bolted or riveted to a base block D, secured in the controller frame bar E of wood, the same as in Fig. 8. The connecting cables are secured to this block as shown. It will be understood that a considerable number of stationary contact parts are arranged along the wood rod E, and that movable contact parts are distributed over the entire surface of the drum A, in rows parallel with the axis of the drum. The contact strips in each row are connected with each other in various ways. When any row of contact strips is under the brushes, strips which are connected with each other will establish contact between their respective brushes.

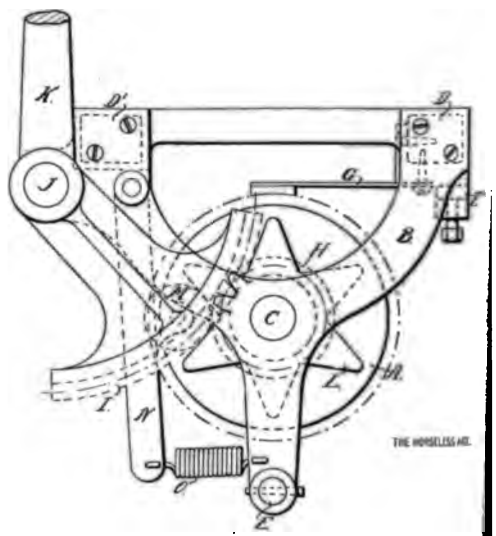


FIG. 10.

Fig. 10 represents an end elevation of one type of controller. A is the controller drum of hardwood and B is a frame casting, of which there are two, one at each end of the drum. These frame castings are provided with bearings for the shaft C of the drum. The two frame castings are held together by two rectangular wood bars D D' and a steel rod E. To the wood bar D are fixed the contact blocks F, which serve as connectors and as base for the contact springs G. The outer surface of the contact strips is indicated by a dash dotted line.

To the end of the controller shaft C is keyed a spur pinion H, with which meshes a gear sector I. The shaft J of the latter

has a bearing in a bracket extending from the frame casting B, and is formed integral with the controller lever K. The radii of the pinion H and the sector I are so proportioned that the controller drum makes a complete revolution, while the lever K goes through an angular motion of about 60 degrees. It is essential to good operation that the controller drum always be left in such a position that the movable and stationary contact parts are in full contact with each other. To insure this, a star wheel L is fixed to the shaft C just inside the frame casting B, and with this star wheel engages a roller M supported on a pair of lever arms N, pivoted at their upper end to the frame and having their lower end drawn toward the frame by a spring O. When there is full contact between the brushes and contact strips the roller rests between two arms of the star.

A few controllers are made to include means for reversing, but usually reversing is accomplished by means of a separate reverser, which is simply a double pole, double throw switch, and operates by reversing the armature connections, as shown in the last instalment of this series. Any of the forward speeds may then also be obtained for backward motion.

ELECTRIC BRAKING.

Quite frequently controllers are designed to convert the motor into an electric brake when the controller lever is moved back of its neutral or dead position. To cause the motor to act in this capacity the battery must be disconnected and the armature short circuited through the field coils. The motor then will act as a dynamo very heavily loaded, and although it will not hold the vehicle in place, nor be very effective at slow speeds, it will very quickly reduce the speed of a car traveling comparatively fast.

Calendar of Automobile Dates and Events.

April 24.—Quarterly 100 Miles Trial of the A. C. G. B. and I.
May 10.—Motor Cycle Century Run.
May 13—14.—Non-Stop Run of the Scottish Auto Club, Glasgow to London.
May 14.—Start of Paris-Madrid Tourist Section.
May 20—21.—Commercial Vehicle Contest under the auspices of the Automobile Club of America.
May 24—26.—Paris-Madrid Race.
June 18—20.—Paris Automobile Fetes.
July 2.—Gordon Bennett Cup Race.

For the restoration of brass articles, says a contemporary, they are first freed from dirt by the use of hot soda lye, then, if they are bronzed, dipped in highly diluted solution of sulphuric acid and rinsed off in clean water. Next they are yellowed in a mixture of nitric acid, 75 parts; sulphuric acid, 100 parts; shining lampblack, 2 parts, and cooking salt, 1 part; then rinsed off and polished, and, to prevent oxidation, coated with a colorless varnish, a celluloid varnish being best for this purpose.

LESSONS OF THE ROAD

A Trip to the Old Home of the Rapps.

By C. Will Travis.

I left the barn one bright morning last spring, after having filled the gasoline and water tanks, oiled all round and given everything a glance as to the fitness of condition generally of the little 4 horse power gasoline runabout for a hard day's work, and was proceeding on my way to New Harmony when the thought occurred to me to look up someone who might have the leisure to enjoy an all day's outing as well as prove pleasant company for the trip.

That I had no trouble in finding such a person was no surprise, and my first stop found me a willing companion, although a somewhat skeptical one as to the results of the trip when told of my destination.

However, Mac and I were soon settled in our seats, well on our way over an old rock road winding through a stretch of fertile valley, again made gorgeous with a wealth of blossoming trees by the gentle finishing touch of spring.

My friend was evidently greatly enjoying his first experience of the automobile mode of travel, as evidenced by a recital to me of some of his earlier experiences of travel through this same country, before the days of the steel rail.

UNIVERSAL COUPLING LINK.

Upon arriving at Blairsville we stopped to make some inquiry as to the condition of the roads beyond, and in looking the machine over before proceeding I found that the universal coupling link between the pump and the engine shaft had broken, and evidently quite recently, as there had been none of the usual outward signs indicating lack of circulation of the cooling water.

As this had previously been found one of the weak points of mechanical construction, and as I had a couple of duplicate links in the tool box, it required but a few moments to make the necessary repairs. While thus engaged one of the inhabitants, in answer to some query of my companion, replied: "Well, no; Blairsville is about the only finished village in the United States; there hasn't been a nail driven here to my knowledge in over thirty-five years."

We had been told that the greater part of the distance after crossing the bridge just beyond, at which the macadamized part of the road would end, would be found quite hilly, although good. We had not gone far on the clay road when it struck us rather forcibly that there was some question whether the word "good" should have been used to describe the road with regard to automobile travel, and I was reflecting that we might have remained long enough to have the statement explained at more detail, when, judging from the sound of things, some of the packing of the cylinder let go as we were ascending a hill. The engine came to a standstill, the brake was at once set with my foot and we coasted backward to the bottom of the grade, where the machine would stand.

AN IMPROVISED GASKET.

Investigation showed that the packing at the top of the valve chamber had blown out. Having no sheet asbestos packing in the tool box I cut a gasket from several thicknesses of envelopes and writing paper, and when in place on the studs, and wet down with water from the tank, the valve chamber plate was put in place, the four nuts pulled down good and tight, and the engine started.

It looked as though the improvised packing was going to hold. We had gotten into the vehicle and were within 20 feet of the top of the hill and Mac was giving voice to some blarney, but all too soon, for the engine stopped with a pop, and we again made the descent backward to the place from where we had started but a moment before.

THE PAPER BURNED.

When the plate was removed that paper packing looked as though it had been struck by a thousand miniature flashes of lightning from the inside, and so it had. Each explosion had penetrated it a little farther, until the weakest point gave way.

But think of the stupidity! We had packing to burn, or rather packing that would not burn—a muffler covered with it, good heavy asbestos, enough to pack any part of the engine a number of times if necessary and still leave the muffler unharmed.

With my pocket knife I soon cut a piece of sufficient size for the gasket from the top layer of asbestos at the bottom of the muffler, where it would not be so plainly seen, and had everything in shape and the engine going again in less than ten minutes.

This time the ascent was made without having to stop, but when the top had been reached it was thought advisable to halt again long enough to tighten the four nuts a little as an extra precaution, for we had found the information regarding the hills quite correct, and for a couple of miles the road appeared to us very much as one might imagine the cutting edge of a cross-cut saw would be to an ant if traveling it.

In passing through Wadesville we noticed that they had made preparations for a spiritual round-up of some kind, but not caring to stop to investigate we continued down the hills and up again until within about 2 miles of our destination, where the road drops down onto the bottom lands of the river, where we found some still harder going.

The road here for about a mile was an almost bottomless pit of sand, but by coaxing the engine and an occasional stop for a second it was finally behind us, and we

were again on a smooth rock road, where it was possible to use the high speed gear to advantage for the first time in nearly 20 miles.

With a good road under us we were soon at our destination, "On the Banks of the Wabash." New Harmony is noted for the location of two famous settlements—first, that of the Rapps, and afterward the Robert Owen Community.

The town is full of many interesting features, such as curious buildings, an old library, an old sun dial, a fort with underground passages from it, etc. The graves of some celebrated scientists are here, and most of the present people are descendants of the Owen Community.

The tavern where we stopped is one of the historic features of the town. After an enjoyable dinner I left Mac to his own resources, with the understanding that we meet at the tavern at 2 o'clock, giving him over an hour in which to see some of the things of interest before starting upon our return.

On the return trip, shortly after passing the stretch of sand and while approaching some of the worse grades encountered on the trip over, I noticed that the power of the engine seemed to be ebbing away; the grades that had been easily mounted in the morning caused a laboring effort on the part of the engine to mount them, until finally it refused to further exert itself. What worried me most was that the steepest grades were yet to be passed.

When the engine came to a stop the machine was let run back to the foot of the hill, to permit of an investigation.

MUFFLER CHOKED UP.

The compression was first tried, and it was found impossible to turn the flywheel over against it, with the entire weight of the body on the crank. The gasoline flow and mixer were then examined, but the trouble was not found there. So the muffler received attention next; a wire spoke was pushed into one of the eighth inch pipe outlets as far as it would reach, and when withdrawn was found to be covered with a pastelike substance, composed of lubricating oil and soot. Evidently this was the cause of the trouble; the eighth inch pipe outlets of the muffler were choked up, and the back pressure thus caused was preventing the engine from developing its normal power, and had been caused by an excessive use of both gasoline and lubricating oil.

To be able to proceed with the least possible delay the

MUFFLER WAS DISCONNECTED,

and the ell on the end of the exhaust pipe turned down, and after securely tying the unsupported end of the muffler with wire to prevent its pounding and any possible danger of breakage, the engine was started and our journey homeward resumed, with the engine applauding us for the much needed attention it had received.

We were about entering Wadesville upon our return, when Mac recalled to my mind that there were evidences of a protracted camp meeting being held there, and we had better be cautious, judging by the number of teams and vehicles that were already gathered when we passed during the morning.

As there was a steep hill to be climbed just upon entering the village, it was very doubtful whether the engine could make it, if the muffler was not properly connected up. So we stopped and left the machine at the foot of the hill, while we went on foot to the top to view the situation, and found to our consternation the assemblage of conveyances so multiplied in comparison with the earlier morning that some drastic measure would have to be resorted to if we were to pass on before dark without causing a stampede.

CAMP MEETING SUSPENDED.

We explained the situation to one of the elders at the tent, and with his aid the meeting under canvas was called upon to suspend to attend their teams while one of those "horribly" noisy horseless vehicles passed down the road. There was a perfect scramble, each man trying to get to his team first, while we came slowly puffing up the hill. At the top the high speed clutch was thrown in, and we were soon going almost as fast as the road would permit, and, barring the narrow escape of running down a belated one, it was a great success, so far as we were concerned. There had been no stampede, but looking back from a safe distance the aspect on both sides of the road indicated that "something had been doing," though nothing serious.

That the worshippers might return to their prayers, now having renewed cause for thankfulness, and bring their meeting to a more fitting close, we waved them an adieu and went on our way through the "Finished Village," and without stop until the city limits were reached, where the muffler was again connected up to the exhaust pipe, after which we continued through the city to the home of my companion, where Mac left me, and I think he was sincere when he said he wanted me to come for him again when I wanted company for a trip.

SOME IMPROVEMENTS.

The next day the muffler was removed, taken apart and given a thorough cleaning, and a valve was inserted in the exhaust pipe between the engine and muffler, with a wire from its stem to a small lever at the bottom of the seat apron. When the lever is depressed by the foot it opens the valve and permits the exhaust to escape without passing through the muffler. The value of this device was demonstrated many times afterwards in traveling some unusually bad stretch of road and when the muffler was the least bit choked. Then the coupling link to the pump was replaced by a loosely fitted piece of pipe slotted at each end to receive the taper pins driven in the pump shaft and the cap screw in the end of the engine shaft, which remedied the trouble.

A Steam Carriage in the Use of an Illinois Physician.

By Dr. James A. Matlack.

In addition to using my steam carriage in the pursuit of my calling, I have also used it for touring purposes. During the month of September, accompanied by my wife, I ran the machine from here to St. Louis, a distance of 200 miles, thence to Chester, Ill., 90 miles, returning over the same route. My vehicle is not a touring car and is not recommended as such, yet we made the trip without unfortunate incidents of any kind. The total distance traveled during the trip was 700 miles. We did not attempt to make a record, yet the time made was very good, considering the fact that the roads were abominable in places.

The trip between here and St. Louis occupied only part of two days. During the trip there were but two days in which we put the whole day in on the road—on one of which our mileage was 113 and on the other 114. This we considered very good time, inasmuch as we had many stops to make.

In my experience I have been over any kind of road that could well be imagined, and through mud of all degrees of depth and consistency, sand, dust, rocks and ruts. Hills are of little consequence to a good automobile if the roadbed be smooth. A smooth road, however hilly, is to be preferred to a road broken from any cause. A moderate degree of dust, sand or mud constitutes no serious impediment. Where mud is deep or soft the automobile meets its greatest embarrassment, and I do not see how the difficulty is to be overcome, considering the manner in which "purchase" is secured on the ground—by revolving wheels, which must slip when a certain condition of muckiness is reached. Deep, loose sand, such as is found in many river bottoms, will form a serious impediment. Dust seldom gets deep or heavy enough to form much of an obstruction. Rough and rutty roads, while usually passable, are probably hardest on the vehicle, as constant jolting is wearing on the machinery and framework of the carriage.

It must be confessed that there is no particular advantage or pleasure in driving an automobile over bad roads. A good team of horses is as good or better under such circumstances. The advantages of good roads to any community are too apparent to need discussion; the accomplishment of good roads is a matter which must be left to the good sense of the general public. The manufacturers and users of automobiles are not responsible for any drawbacks to their use which may exist in any given locality because of impassable highways. The general adoption of the automobile, and the recognition of the fact that it can be used to its best advantage over good roadbeds, will result in great improvements along this line.

The makers of automobiles must keep in

the fact that American roads fall con-
bly short of averaging up to the
In seeking to put automobiles into
al use, they should be so constructed
take roads as they find them.
n not sufficiently versed in the tech-
details of vehicle construction to be
o point out just where weak points
l be strengthened, but there must be
vement somewhere. Very few auto-
es now on the market are able to
the stress of bad roads without more
ent wear and tear than should be ex-
l in a high priced vehicle. There
be better construction on the part of
anufacturer and less work for the re-
nan. The manufacturers are recog-
this fact, and there is being mani-
a gradual withdrawal from the light-
t "bicycle" model, and a return to
substantial modes of construction.
eneral use the automobile should be
s near as possible along the lines of
vonderful one hoss shay"—as strong
part as another.
to my individual experience in the
of difficulties, I can say that I have
nsiderably less trouble than I antici-
Before I bought my runabout I
ttle or no knowledge of machinery,
made it my first business to gain a
igh understanding of the machine in
parts. With this understanding,
is not hard to acquire, and a general
ition to attend to all matters in a
on sense and careful way, I have suc-
in getting along with very little
e. A careless person, or one who
grasp simple details of mechanical
uction, had better stick to horses.
nt vigilance is necessary to avoid
assment, but the operator who makes
le to be careful and watchful at all
soon becomes able to manage and
fter his automobile as naturally and
as a good horseman looks after his

busy practitioner of medicine is one
best examples of one who "leads
renuous life." Much of his life is
on the highway. The automobile is
trenuous" vehicle of the road. It
s that the automobile must be
d by the physician, and it in turn
be made more and more adaptable
needs.

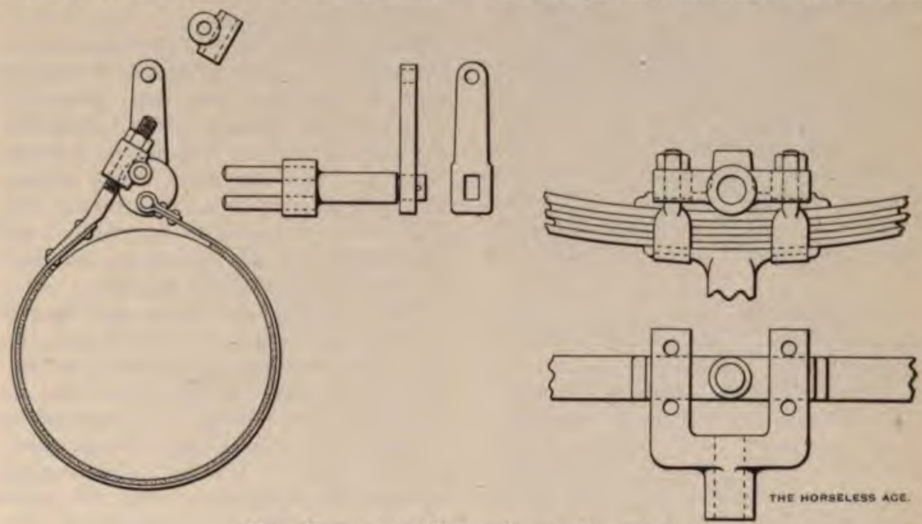
hard soldering with borax, direct,
are several little difficulties encoun-
hat make the process somewhat dif-
In the first place the salt forms
bubbles in contact with the soldering
nd easily scales away from the sur-
f the parts to be soldered. Besides
he parts must be carefully cleaned
me prior to applying the salt. All
difficulties vanish, says a contempo-
f instead of borax we use its com-
parts, boric acid and sodium car-
. The heat of the soldering iron
on these causes them to combine
a way as to produce an excellent
ee from the difficulties mentioned.

..COMMUNICATIONS..

A Hub Brake Design for Steam Cars.

Editor Horseless Age:

In answer to your recent request I send the enclosed sketch of parts of the hub brakes applied to my White steam stanhope by the Seeley Manufacturing Company. I simply told them what I wanted, and their foreman, L. W. Creter, worked out the details and put it on. As the original wire spoked wheels left no room on the hubs to attach a brake drum, tubular wheels were substituted, and a pattern made from which two pulleys were cast of 8 inches diameter and 1½ inches face between flanges for the brake band. These were shrunk and keyed on the inner ends of the hubs. Two U shaped forgings were made, having a boss or hub at the bottom



Hub Brake for White Steam Stanhope.

of the U, which was bored for the small rock shaft to operate the brake band. These forgings were attached to the rear axle arch by means of the spring clips, which in this model of car are quite substantial, making a perfectly solid and reliable job, though in some makes it would hardly answer. Each rock shaft was turned out of 2 inch iron, leaving a boss 1¾ inches in diameter on the outer end, into which were set and riveted two seven-sixteenths inch pins, as shown in the sketch. The body was turned to 1 inch to fit the bore of the boss in the U forgings, and the inner end was shaped into rectangular form to receive an arm 3½ inches long between centres. The sketch shows the method of taking up wear in the brake bands, and also that the brakes are effective for either direction of rotation. A shaft was put across under the body, forward of the engine, having a hand lever (with ratchet) on the right side, and a short lever on the left. These levers were connected to corresponding rock shafts by rods having forked ends.

These hub brakes have proven satisfactory, and a great advantage in use. They were desired not because the regular brake was not efficient, but because in this section, where we have hills from 1 to 2 miles long, steep enough to require braking the entire way, any brake band will heat so as to destroy it in a very short time, and the only salvation is to have two good reliable brakes, each of which can be used for a short time, while the other is cooling. Only yesterday I saw a fine American touring car come into a garage with a little column of smoke curling up from under the rear fender. I looked to see if it had a "hot box," but found it was a piece of the wood blocks which line the brake bands, about 1 cubic inch in size, entirely detached, and lying on top of the brake drum in the gap between the ends of the band. It was at the moment a live, glowing coal of fire, showing conclusively the heat generated by braking a vehicle on Pittsburg hills, for it had not been off city streets, nor over a mile from the station. This is not the first time I have had personal demonstration that wood shoes will "fire" on our hills, and I well knew before that some less inflammable material is essential there. B.

Two Cycle Motors.

Editor Horseless Age:

I give below a few results obtained in tests of two cycle auto engines, which you will note are not in keeping with the statements made in Mr. King's letter, on page 430 of your paper. The Elmore engines (double cylinder, 4x4 inches) are tested with a Prony brake having a 4 foot lever arm. At a speed of 400 revolutions per minute the pressure on the scales is but a little more than 14 pounds on the average. As the engine speeds up this pressure falls off a very little at a time until at 1,000 revolutions per minute it is slightly over 13 pounds. These figures increase as the engine gets worn in, and we recently tested a single cylinder of one of these engines, which had been in use for several months, and which gave a pull of 9 pounds steadily for over an hour, with the en-

gine running at 775 revolutions per minute. You will note that these speeds are much higher than those at which marine engines are ordinarily operated. With long crank shaft bearings we have found that the wear after a year's use is not sufficient to make an appreciable difference in the power of the engine.

In the mater of wastefulness of fuel and burned oil, I would call attention to the fact that men are working constantly around the testing block and suffer no inconvenience whatever from gasoline fumes or smoke. The engines exhaust directly into the room without the intervention of a muffler. There is perhaps a slightly greater fuel consumption in the ordinary type of two-cycle engine than in a four-cycle, but it is very small indeed if the same care is taken in setting the vaporizer. On a thousand mile trip last season over roads good, bad and awful, the owner of an Elmore reports a fuel consumption of 23½ miles to the gallon, carrying three passengers and luggage—in all a total weight of 1,650 pounds.

Regarding the two cycle engine for stationary purposes, I would call attention to the fact that twenty-two cycle engines of 1,000 brake horse power each are now being installed at the works of the Lackawanna Steel Company in Buffalo. These engines show, if anything, a better fuel economy than the four cycle. Of course, I understand that these engines use a separate pump instead of an enclosed crank case.

I fail to see the justice of comparing a marine two cycle engine designed for low speed with four cycle engines designed especially for high speeds. With the permission of the Elmore Manufacturing Company, I am going to point out the principal reasons why their engine will run so successfully at high speed, while a two cycle marine engine does not do so. A two cycle marine engine draws its charge into the crank case during the entire upstroke of the piston. The Elmore crank case port, however, is controlled entirely by the piston, which uncovers the port in precisely the same way as it does the cylinder ports. Note carefully that there is first a vacuum formed in the crank case, and, when the piston is nearly at the top of its stroke, the crank case port is uncovered, causing the mixture to rush rapidly in from the vaporizer. The piston closes this port on descending and the contents of the crank case are compressed. Those familiar with the history of gas engines will at once recognize the principle of the first Day engine. The use of this system enables us to avoid the check valve and its "choking" effect. The 1903 Elmore engine uses a float feed vaporizer with no valve or moving part. Hence the engine does not "choke" itself at high speed. The engine is absolutely under control of the throttle and this control is so good that we are able to avoid the complications of an igniter with a variable lead. *We could probably* obtain slightly better results by advancing the lead for high speeds, but the engine runs so exceedingly well without it that we have decided it would not be worth while. Then the ports in the Elmore engine are carefully proportioned to the speed of the engine. Both the area and the location of the ports are most important. The proper proportions can be found only by careful experiment. The fact that the power of the 1903 engine is considerably greater than those of 1902 testifies to the value of experience in two cycle practice.

I wish to impress upon you the fact that the figures above given are data that have been actually obtained in practice. They are the results of tests of an up to date cycle engine and are figures that I guarantee to be correct. It is these figures and not those taken from marine practice that should, in all fairness, be used when comparing two cycle and four cycle automobile engines.

E. W. Roberts.

Indiana Has No Automobile Law.

Rockville, Ind., April 4.

Editor Horseless Age:

Your reference to an automobile law in Indiana in your issue of March 25 has just come to my notice. You report such a law passed by the Indiana General Assembly at the instance of the Indianapolis Automobile Club. It is leaving a wrong impression with your readers not to correct this. Such a bill passed both branches of the Legislature, but was vetoed by the Governor as being technically wrong.

The bill was introduced by Senator Johnson, of Montgomery County, very early in the session and was proposed by the National Horse Thief Detective Association, an organization of farmers, who undoubtedly got their ideas at long range through newspaper caricatures. I do not know what the Indianapolis Automobile Club did while the bill was up for consideration. Indiana has no automobile law and will not have any for at least two years, as our Legislature does not meet again until 1905.

I am glad the above mentioned bill failed to become a law, as in two years more the motor vehicle industry will have grown to such an extent that the people and their representatives in the General Assembly will have a much better idea or understanding of the subject.

A brief outline of what we would like to see embodied in Indiana law is this:

1. Moderate speed in passing other vehicles or machines.

2. Moderate speed at road or street crossings.

3. Engine exhausts to be well muffled in meeting or passing teams.

4. Owners and operators to be heavily responsible for the strict observance of the above provisions.

5. All hitching posts to be removed from the highways and street.

6. Hitching in the highway or street and the driving of horses by incompetent persons to be held as contributory negligence.

7. Horse owners and drivers to be fully responsible in the fifth and sixth provisions.

We thus divide the responsibility for the public safety and admit the right of the motorist to live and use the highways, which seems to be the stumbling block of all the lawmakers at the present time.

If the penalty for violation of the first three provisions be made heavy enough there will be no need of a speed limit. The operator's sense of responsibility will be all the speed limit needed.

When there are no teams or crossings just ahead, let the motorist make the best speed he can with safety to himself and passengers, and the driver alone must be trusted for this.

The use of the motor machines brings new conditions that must be observed by the users of the horse and makes the fifth and sixth provisions necessary to the public welfare.

Legislators cannot make conditions, but only meet them as they exist, and no amount of automobile legislation will hit the spot until the horseman is made to realize that half the trouble and responsibility rests with him.

We are throwing away our efforts and much valuable time when we try to get favorable speed limits through the various Legislatures. We believe in throwing off the mask, make the horsey people know we are here and here to stay, get down to the seat of the trouble and fix it for all time to come.

E. L. Osborne.

Touring Route from Buffalo to Boston.

Editor Horseless Age:

It is my intention to tour per auto from Pittsburg to Boston during the month of June next, accompanied by wife and daughter. I have been to Buffalo and know the route from Pittsburg to Buffalo quite well, but would like to get the proper route between Buffalo and Boston. Could you print it in The Horseless Age?

Dr. W. C. Cook.

[The usual route from Buffalo to Albany is that followed in the New York Buffalo Endurance Contest in 1901, and is as follows: Buffalo, Bowmansville, Wilhelm, Millgrove, Crittenden, Corfu, West Batavia, Batavia, Newkirk, Byron, Bergen, Churchville, North Chili, Gates, Rochester, Pittsford, Egypt, Macedon, Elmira, East Elmira, Newark, Lyons, Lockberlin, Clyde, Savannah, Montezuma, Port Byron, Windsport, Eldridge, Camilles, Fairmount, Syracuse, Dewitt, Fayetteville, Myconac, Sullivan, Quality Hill, Oneida, Oneida Castle, Sherrill, Vernon, Lairdsville, Kirkland, New Hartford, Utica, Frankfort, Ilion, Mohawk, Herkimer, Little Falls, St. Johnsville, Millerstown, Palatine Bridge, Yosts, Fonda, Tribes Hill, Aiken, Amsterdam, Cranesville, Hoffman Ferry, Scotia, Schenectady, Niskayuna, Newtonville, Ludenville, Albany. From Albany to Boston the following route is usually followed, which, from Springfield to Boston, is identical with the

York-Boston Endurance Contest Albany, Lebanon, New Lebanon, ld, Lenox, Middlefield, Hunting-Fairfield, Westfield, Springfield, Wilbraham, Palmer, Brimfield, Warren, Warren, West Brookfield, Brookfield, Spencer, Leicester, ster, Shrewsbury, Northboro, South-South Framingham, Natick, Welles-wton Falls, Newton Centre, Boston. following distances may be useful: to Rochester, 70 miles; to Syracuse, es; to Herkimer, 65 miles; to Al-82 miles; to Springfield, about 75 to Worcester, 52 miles; to Boston, s.—Ed.]

Testing of Dry Batteries.

Horseless Age:

ply to an inquiry in the last issue of Horseless Age, I wish to say that er readings of dry cells or any other f cells should be taken while the is standing still and with the battery closed through the sparking appa-The readings taken in this way will give ample warning of approaching The voltage of the entire group of use should always be at least 1½ or Six new dry cells tested in this way ow about 6 volts and will drop off ge gradually, while storage cells will within a few tenths of their maxi-oltage up to the time they are prac-exhausted.

Lewis Jones, Jr.

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mobiling on Mountain Drives Objected to.

Horseless Age:

every other person interested in the bile, I am also interested in The ess Age, and I believe I am safe in that for nearly six years I have not a copy. I simply say this to tell you e clippings from Western papers are d.

ourse, we all know that there is on both sides. We should all do all to prevent accidents. What is a are, a little time lost, compared e injury and possible loss of life that caused by thoughtlessness? Really, ot get myself to think that anyone cause an accident and not care, as llows" would have us believe.

Thomas R. Hartley.

of the clippings referred to is from nsas City *Journal* and is headed Deadly Automobile"; it deals with gislation in the Kansas Legislature. ther clipping is from a Califor-er and denounces the use of auto-on mountain drives, for the reason horses should shy at an auto on mountain drives a very serious acci-ould be most likely to result. The e that automobiles have as much the roads as horses applies, we pre-as much to mountain drives as to oads, at least so long as no special ces are passed closing these drives to autos. It is, however, not to be recommended to make use of any such privileges as long as the horses used on these mountain roads are unaccustomed to automobiles. Nearly all of the mountain roads of Switzerland are closed to automobiles, and most of the bad feeling against automobiles in California has been caused by encounters of horse drivers with automobiles on such roads. The intensity of this feeling is, to some extent, reflected by the last mentioned clipping, which concludes:

There is no sentiment in Santa Barbara against the auto. It is hayseed resentment that fights them. But there was a widespread complaint yesterday of the running of machines over the Mountain Drive, and probably the supervisors will be asked at their next session to pass an ordinance prohibiting their use on the Drive or on the San Marcos road.—Ed.]

Engine Faultily Assembled.

Editor Horseless Age:

I wish to call your attention to an experience I had which illustrates how carelessly things are often put together in shops that claim to do first class work. This spring I entirely overhauled my engine, putting in new pistons, shaft, links, etc. In taking off the cover of the left cylinder I found that the part of the cover which is gouged out to correspond with the upper port was placed on the side opposite the port, so that the latter was almost entirely closed where it opens into the cylinder. The screw holes were drilled so I could not put the cover on in the correct place, and had to gouge it out in another place to give some opening to the upper port. The fact that this machine has been used in that condition for two complete seasons seems to prove that no matter how indifferently a steam engine is built it will run.

Ernest Duval, M. D.

Re Experience with Electrics.

Editor Horseless Age:

In your issue of April 10 a correspondent speaks in discouraging terms of his experiences with an electric automobile. His conclusions appear to be that the power is a failure, so far as practicability is concerned. A few hints he drops regarding the weight of his machine and voltage of his batteries indicate that the carriage was an old style one, or else of a kind that took a great amount of power.

I have had a runabout electric, weighing less than 1,000 pounds, with a thirty cell battery, that is giving perfect satisfaction. I have had the machine nine months, and in that time the batteries have never been washed out, and the only cost has been less than $2 for a rubber covering and perhaps $3 for acid. Otherwise the battery has not received a particle of attention from experts. A recent examination showed that the cells were still in fine shape.

A point your correspondent makes against electrics, that is, that he had to charge the machine every time it was used, puzzles me. My carriage is run daily, averaging from 5 to 25 miles, and it is not charged until the voltage drops down to the danger point, unless an especially long trip is contemplated. I find that the battery recuperates when left over night, so that the voltage is considerably higher than when it was left. I had an experience recently, when the machine was run over 25 miles after it had been on a 15 mile trip, with hard roads. The power gave out on a steep hill, and a horse was used to pull the machine to a barn. Five or six hours later I went after the carriage to tow it home, and I found that the battery had recovered power enough to drive the carriage 4 miles, and part of the distance was up grade. I find that if a distance of 40 miles is run in four instalments the battery will give it easily, but if the whole distance is taken out on a single run the power grows weak at the end of trip.

So far as expense is concerned, I have not found the cost of maintaining the electric anything like that of other powers. I keep the machine in my stable, where I have a charging plant. So there is no cost for storage or care. Even if each mile cost double the expense of a gasoline carriage I should still have the electric, for it is so convenient that it cannot be spared. It is quieter in operation than horse, and the carriage rides comfortably even on rough roads, because it has easy springs and upholstery, together with 3 inch pneumatic tires on 30 inch wheels. I know that some electric carriages have been put out with very short wheel base and hard rubber, tires, but such old fashioned machines should not be used for purposes of comparison.

My electric machine has never given a minute's bother when on the road; it is always ready to run, and is clean and noiseless, while the cost is not excessive when compared with a horse, and it will travel four times the distance any equine can cover regularly. When properly used I see no reason to find fault with the electric carriage.

Robin Damon.

A reader inquires of what Dr. Norwood's compound for filling pneumatic tires, which has been referred to in a former issue, is composed. We shall be obliged for replies to this query from readers.

The Star Engineering Company have protested against the Wolseley Tool and Motor Car Company being allowed to compete in the elimination trials for the Gordon Bennett cup team in England, the Wolseley firm not having entered before the limiting date fixed. The eliminating trial is to be held at Welbeck between the Star and the third Napier car. In case the latter wins it will be driven in the cup contest by J. W. Stocks. The Star machine weighs within 2 pounds of the weight limit of 1,000 kilogrammes.

NEW VEHICLES AND PARTS.

A New Haynes-Apperson Machine.

The Haynes-Apperson Company, of Kokomo, Ind., are bringing out a tonneau with an opposed horizontal cylinder motor in front. One of these rigs with testing body and with Elwood Haynes, president of the company, in the seat is shown herewith. The demand for a tonneau body has necessitated placing the engine in front, but the makers have retained the double opposed cylinder motor, which they were the first to use on automobiles and with which they have scored many successes in contests. The chief advantage of this type of motor is its freedom from vibration and an endeavor has been made to have the photo bear witness to this quality. The photographic plate, we are informed, was exposed five seconds while the engine was running, as shown by the flywheel and the drive wheel on the oil pump. If there had been any perceptible vibration the photograph of the car would not have been as clear as it is.

HAYNES-APPERSON TONNEAU.

When the car is finished it will be provided with an aluminum body with "King of the Belgians" tonneau seats. Owing to the horizontal arrangement of cylinders the vehicle has an exceptional road clearance and still a very low centre of gravity. All the shafts are parallel with each other (no bevel gears being used) and are mounted on roller bearings.

TWENTY HORSE POWER VIVINUS "KING OF BELGIUM" TOURING CAR.

The Vivinus "King of Belgium" Twenty Horse Power Touring Car.

Vivinus & Co., of Brussels, Belgium, have appointed Eugène Bonnionville as the American agent for, and A. Champion as the New York salesman of, their vehicles. Three distinct types of cars, an 8-10, 20 horse power and a high powered car are built by this company. The accompanying half tone illustrates the model A tonneau, which is said to be capable of traveling at a maximum speed of 50 miles an hour.

The wheel base is 6 feet 2 inches and the tread approximately 50 inches. The wheels are all of a size, of the artillery plain bearing type, and are shod with 32x3½ inch Michelin clincher tires. The front axle is a solid forging with knuckles of the Panhard type. The rear axle is of the live variety, bevel gear driven and is trussed. A four cylinder vertical engine under a square bonnet in front represents the prime mover. It is rated at 20 brake horse power and is capable of running at speeds varying between 150 and 1,600 revolutions per minute. All the cylinders are of the individual type, with integral heads and water jackets. The crank case is of aluminum and is arranged for splash lubrication of the pistons, etc.

A somewhat larger flywheel than those of French motors of similar rating is used, and instead of a conical, leather faced clutch, an expanding ring clutch is employed. A single Longuemare carburetor furnishes the mixture. To heat the inrushing air a bifurcated tube is used, each branch of which is secured to an exhaust pipe, and the air is thus induced to absorb heat before passing into the carburetor. In warm weather a small valve is opened to admit air direct, i. e., without heating it. Ignition is by the jump spark system and wet batteries which are located in a box on the step. If the motor has been running and is shut down for a while, it will start up by throwing the switch. It is claimed that the engine may be started in this way after a night's rest. The inlet valves are of the automatic type, and a ball governor which acts on a separate throttle valve is employed.

The change speed gear gives four forward and a reverse speed with direct drive on the high gear. The cooling system consists of a copper tank, holding 5 gallons, a gear driven circulating pump and a large circulating coil. The latter has two sections, the upper one of which is placed under the bonnet in such a way as to appear like a honeycomb cooler from the side. The gasoline tank holds 10 gallons and is located under the front seat. A lubricator and its reservoir are secured to the water tank so that the feeds are ever in view. Steering is done by means of a wheel with worm and sector reduction and a link with ball and socket joints. A thumb lever for spark timing and another for the mix-

re grouped around the steering col- To relieve the clutch a pedal is pro- while another is fitted to serve the purpose and apply the transmission All the forward speeds are engaged ingle hand lever, but a separate lever ovided to throw in the reversing The long panel lever applies the hub without the intermission of an ing device.

Simmons Kerosene Burner.

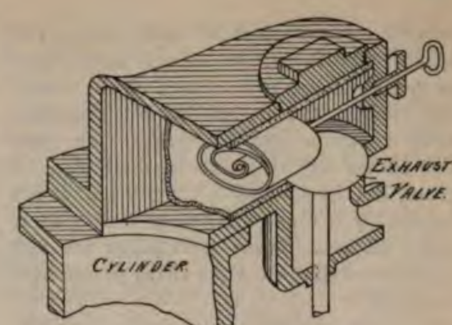
number of kerosene burners for carriages upon the market is gradu- creasing, and a notable feature of all produced in this country is that they f the multiflame Bunsen type, the as gasoline carriage burners. The lifference between these kerosene and dinary gasoline burners resides in the zing attachment. The burner illus- in the accompanying figure has just

Simmons Kerosene Burner.

brought out by the John Simmons any, 110 Centre street, New York The burner proper consists of a er of tubes, slotted on their upper which radiate from a central chamber directions. The outer ends of the are closed. The mixing tube enters entral chamber from above and ex- out through the side wall of the r casing. The mixing tube is sur- ed by a coiled vaporizing tube, shield- from the most intense heat, yet per- g it to be sufficiently heated to pre- the gas from condensing in the air before it reaches the burner. initial heating of the vaporizing coil cted by means of a torch plainly seen e illustration. The advantages of ene are well known and it is generally lered the future fuel for steam cars. g other things it removes the insur- restrictions on buildings in which gas- is kept.

Lang's Automatic Igniter.

sketch herewith represents an igniter asoline engines invented by James S. of Boston, which depends for its upon heat from the explosions stored coil of nickel or platinum in the valve ge. The valve passage is internally with asbestos, to keep the coil hot en explosions. The igniting coil is fixed to the end of a rod passing through the wall of the valve chamber and by moving the coil longitudinally in the passage the time of ignition can be varied. Electric ignition must, of course, be fitted for starting. A difficulty that would undoubtedly be met with would be that when the engine was running on the throttle the time of ignition would automatically vary with the throttle opening, the same as with hot tube ignition.

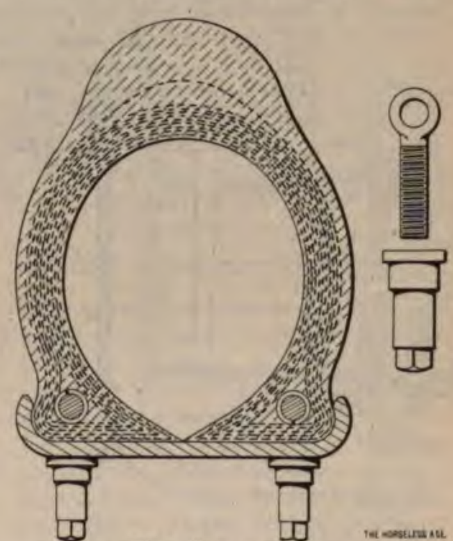


Lang's Automatic Igniter.

The Collier Tire.

The Collier tire, manufactured by the Collier Twin Tire Company, Limited, of 210 Shaftesbury avenue, London, W. C., is of particular interest as being the tire which had the smallest number of marks deducted in the recent tire trials of the A. C. G. B. and I., losing only forty-eight minutes in 4,000 miles. The Collier is a double tube tire and its peculiarities reside in the form of its tread and in its method of attachment to the rim. The tread is narrow and round, and a number of advantages are claimed to result from this form. The surface of road contact is reduced to a minimum, and with it the chances of picking up vulnerable matter, such as nails, broken glass, flints, metal and so forth. At the same time, mud throwing and dust raising by the tires are reduced to a minimum.

The form of attachment of the tire to the rim is plainly shown in the illustration. It is claimed that the outer cover cannot possibly leave the rim while the car is running owing to a burst or any other trouble, and can only be detached when the car is at a standstill.

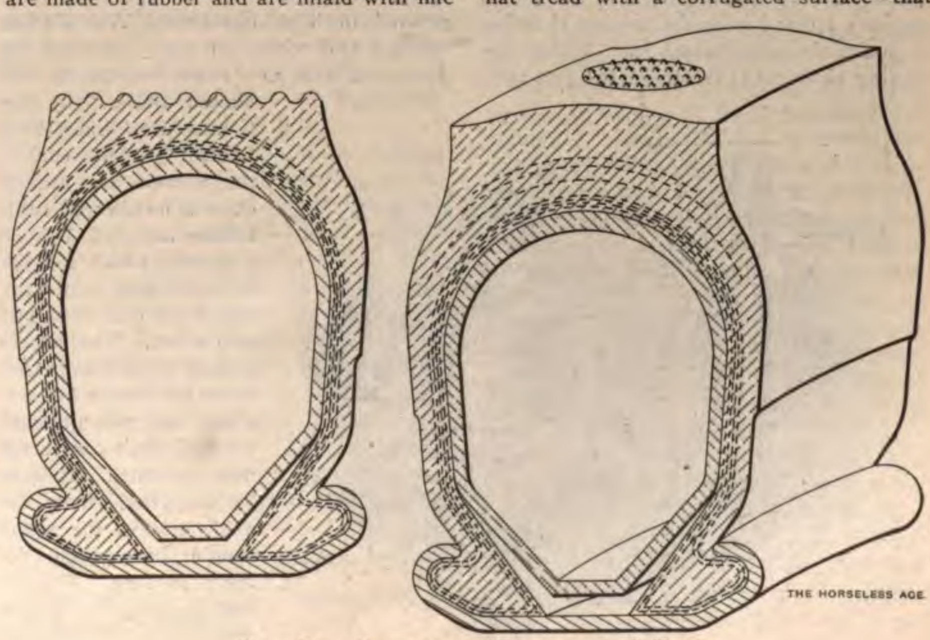


The Collier Tire.

New "Continental" Tires.

All the new designs of tires of the Continental Caoutchouc und Gutta Percha Company, of Hanover, Germany, are provided with renewable treads. These treads are made of rubber and are inlaid with fine mesh canvas, which is very invulnerable to stones and sharp objects generally. Several of the leading European tire manufacturers now construct their tires with such renewable treads and it is somewhat surprising that the idea is not being taken up here.

The Continental Company has also brought out for this season two new forms of anti-skidding tires which are illustrated herewith. The first of these has a narrow flat tread with a corrugated surface—that

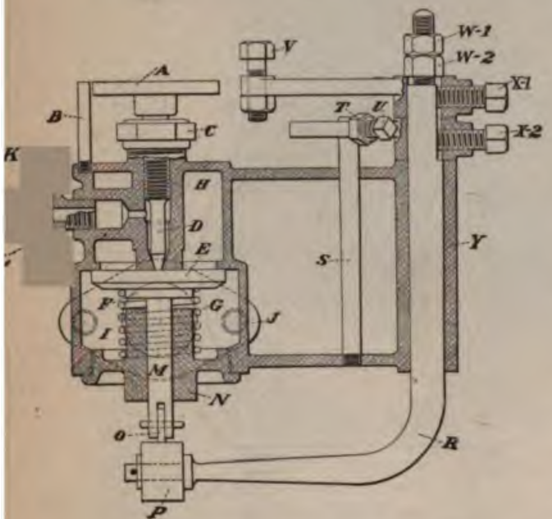


Two New Designs of "Continental" Tires.

is, with alternate furrows and ridges. The idea of this surface is, of course, not new, as it is embodied in tires now on the American market, but in this tire it is combined with a narrow and flat tread. The other tire shown has the same general form of tread, but its surface is smooth and it has inserted in it round steel plugs with a sharp outer surface. These steel plugs are said to be renewable when the sharp points have worn off.

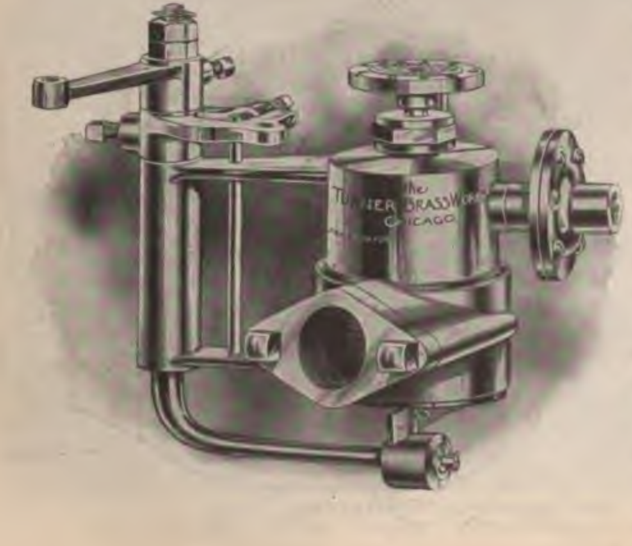
The Turner Carburetor.

The accompanying two cuts represent a carburetor manufactured by the Turner Brass Works, of Chicago, Ill. The de-



vice is of the mixing valve type and is provided with a throttle arrangement for controlling the speed of the engine. The gasoline arrives at the top of the mixing chamber through the fitting K, in which is located the wire gauze screen L. The flow of gasoline is regulated by means of the needle valve D, fitted with a thumb wheel A and a stuffing box C. A pin B projects upward from the mixing chamber to make the adjustments by. Within the mixing chamber is located a flat seat poppet valve E, which shuts off both the air and gasoline. This valve is held up to its seat by means of a coiled spring G. At the lower end of the valve stem M (which passes through a guide N) is fastened a crosspiece O, with which engages a roller P at the end of the bent arm B. The shaft of this bent arm is journaled in a bearing Y, supported upon arms extending from the wall of the mixing chamber. This bent arm B can be turned around the centre of its bearing by means of a lever arm fastened to its upper end. It will be apparent that the roller P at the end of the arm B limits the opening of the valve E, and since the lower edge of the crosspiece O is inclined, if the arm B is swung around its shaft centre, the possible lift of the valve E is thereby varied. Means are also provided for limiting the motion of the arm B around its shaft centre, these consisting of a rod S and a set screw U.

The mixture forms in the lower part of the mixing chamber and flows to the engine through a pipe which is connected to the carburetor by means of a flange joint J. It will be noticed that the fitting for straining the gasoline is so applied as to be easily removed for cleaning. This carburetor begins to work without any preliminary starting or priming operations and is claimed to maintain a practical constancy of mixture for all degrees of throttling.



Report of International Automobile Congress.

The full report of the International Automobile Congress, held in Paris from July 9 to July 16, 1900, has just been published in bound form, and a copy has been received at this office. The report covers no less than 600 pages and is bound in paper. Most of the papers of general interest read before the congress were reprinted in THE HORSELESS AGE during the fall and winter of 1900. Among the papers is one on "Automobilism in the United States," by the Count de Chasseloup Laubat. At the end of the volume are printed quite a number of resolutions adopted by the congress, which for the greater part unfortunately are still to be put into effect. The papers contain much that is useful to the automobile engineer and user, although much of their contents is now antedated. It is to be regretted that the publication of the report should have been delayed so long. The report is published by the Imprimerie Hemmerlé et Cie., 2 Rue de Damiette, Paris.

...OUR... FOREIGN EXCHANGES

Motor manufacturers should keep their eye on Australia, says an export journal. The introduction of gasoline motors on the non-paying railways of Victoria has been discussed. Should the experiment be tried and prove successful, it will create a large demand for motors in the commonwealth.

A strong man exhibiting in Paris has devised a new sensation. Instead of pitting himself against the strength or weight of horses, he tackles a motor car. A 6 horse power voiturette is brought on the stage, and the athlete, planting his shoulder against the bonnet, successfully resists the engine's efforts to propel it.

The first event of the Nice week, which was to have occurred on Saturday, March 30, had to be postponed, owing to rain and the bad state of the roads. On Sunday, March 31, the weather was fine, and the automobile battle of flowers and fête in the Jardin Publique was a great success. Many of the cars were beautifully decorated.

The Automobile Club of Great Britain has just received an application from the Wolseley Tool and Motor Car Company for permission to enter a racing car for the forthcoming eliminating trials in connection with the Gordon Bennett Cup race. The only two firms who paid the £500 deposit were the Star Engineering Company and S. F. Edge, Limited, and these firms have been asked whether they would object to the Wolseley car being entered.

Chevalier Réné de Knyff, the well known racing automobilist, and the Count de Vogué have just paid a visit to Ireland as a delegation from the Automobile Club de France to inspect the course for the Gordon Bennett Cup race. M. de Knyff expressed himself fairly satisfied with the course. The chief point which he regards with disfavor is the fact that for 30 per cent. of the course it will be impossible for the cars to pass one another. With the surface M. de Knyff was well content, and the road menders are hard at work effecting improvements, but the corners are in one or two instances severe. M. de Knyff's interest in the course is direct, as he and M. Maurice Farman will drive the Panhard cars in the race.

Some idea of the state of the roads in Spain over which the Paris-Madrid race will be held may be gained from an account of a trip over the course undertaken by the Duke of Santo Mauro. On arriving at Galapagar, the car driven by the Duke, which was traveling at the rate

30 miles an hour, gave such a vio- over a rut in the road that the nt wheel was wrenched off, the rturned, and all its occupants out into the road, with the excep- the Duke of Santo Mauro, who ined firm hold of the steering No occupant escaped unhurt, al- fortunately none of the injuries rious. The second car succeeded ng to a standstill just in time to serious catastrophe.

nglish contemporary deplores that has not up to the present visited mobile show. Evidently he has the standpoint of the Automobile at so long as the trade cannot agree how question he won't have any- do with automobile shows at all.

ny small towns of the old country erated and hand drawn fire pumps being used. At Voiron, Isere, such a pump was recently hauled n automobile, the firemen perch- t as best they could, and the fire ched much earlier than would e have been possible.

been suggested in London that al meet of automobilists should at the Powder Magazine in Hyde ring the height of the season, on lines as the meets of the Four-in- d Coaching clubs, to be followed rade through the park. This, it would tend to impress the au- with the growing power of auto- s.

Automobile Club of France ob- s taken to the hour fixed for the the Gordon Bennett Cup race, is contended, should be either 4 ock in the morning, instead of 7. eather is hot the strain of running speed for nine hours will, it is e too hard on the drivers, where- earlier start this objection is sen- odified.

on, France, the automobile has sed by "moonshiners" for two The products of the illicit still ed into cans of special form very to those in which gasoline and s sold in France to automobilists. h class 8 horse power automobiles alt in front of the place and the re packed into their cases and a wareroom.

op reckless automobile speeding be the easiest of the duties of the The following philosophy on the is credited to an Irish "pillar of :

e, an' Oi've often been after won- ow Oi'd stop one av' thim things nted to; if Oi thought Oi'd only enough to have a pinsion Oi'd try, but, shure, Oi might be kilt entoirely, and then the pinsion would be no good at all at all."

In an affiliation conference of British clubs it was decided that no secretary or honorary secretary of an affiliated club shall be engaged in the automobile trade. No official or leading authority of a club should possess any motor trade interests.

At a meeting of clergy and laity held in Newcastle-on-Tyne, England, to recognize Bishop Jacobs' seven years' work, it was proposed to buy him a motor car for use in his new diocese of St. Albans. The Duke of Northumberland wrote saying he would gladly co-operate, and that the motor car was an excellent suggestion. It was understood that a motor car would be acceptable to the bishop.

A universal exposition of sciences, arts and industries, will open at Liège in the month of April, 1905, and will last for at least six months. An invitation is extended to the United States to participate. The price for space will include the expenses of general decoration and handling charges. The Belgian Government will grant free return transport on the State railways to foreign exhibits.

New York Automobile Trade Association.

A meeting that was called for and held on Friday last for the purpose of organizing the New York Automobile Trade Association was poorly attended, for two reasons, that it was Good Friday and that several of those dealers who were anxious to attend were under the impression that the meeting had been called for Saturday. The few who were present talked the matter over, while John J. Plummer presided, and finally decided to have that gentleman act as temporary secretary for the purpose of notifying all interested that an adjourned meeting will be held tomorrow night. The session will be at 1713 Broadway, and it is hoped that all of the New York trade will be represented.

It is understood that one of the matters that will come up for consideration will be the question of having the dealers agree to move out of "Automobile Alley," as West Thirty-eighth street is called. The effort is to have the dealers all together further up town, in the vicinity of the Park. The objection of those who are at the head of the movement to the present district is that it does not afford sufficient facilities for demonstrating and that there is not enough room for proper quarters. There is a feeling that rents are higher there than prevail in the section now urged for adoption.

New Incorporations.

Hartford Auto Livery Company; to do business in Connecticut.

National Automobile Company, St. Louis, Mo.; incorporators, M. S. Breed, R. D. Talmage and A. D. Scott; capital stock, $10,000.

The Adrian (Mich.) Auto Truck Company; capital stock, $500,000; to manufacture Frank E. Schoonmaker's quadruple, four cycle explosive engine.

Hartford (Conn.) Motor Vehicle Company; capital stock, $50,000; Charles E. Duryea, Reading, Pa., president; Henry Crowthier, Ridgewood, N. J., secretary.

Bachelle Automobile Company, under the laws of Illinois; to manufacture automobiles; capital stock, $100,000; incorporators, Otto Van Bachelle, S. W. McKee and J. F. McBride.

Black Diamond Automobile Company, Geneva, N. Y.; capital stock, $500,000; directors, De Witt Hollenbeck, of Geneva, and C. E. Turner and William Dieter, Brooklyn.

The Union Motor Company, Portage, Ohio; capital stock, $15,000; incorporators, Charles B. Rush, Howard C. March, Samuel R. Light, Charles M. Caldwell, Alva Shroyer, Mason Pultz and Alvin Marcks.

Trade Literature Received.

Graham Electric Roadster.—Graham Automobile and Launch Company, 145 La Salle street, Chicago.

Lightning Burner.—E. C. Walker Company, of New Albany, Ind.

The "Winton."—Winton Motor Carriage Company, of Cleveland, Ohio.

Motor Vehicles and Kerosene Engines. —International Power Vehicle Company, of Stamford, Conn.; A. I. Carver, agent, 514 Pearl street, New York.

How to Pack Gas Engine Cylinder Heads.—H. W. Johns-Manville Company, of 100 William street, New York.

Friction of Ball Bearings.

In a paper read before the American Association for the Advancement of Science M. J. Golden describes some tests made with hardened steel balls of .25, .3 and .5 inch diameter respectively at speeds varying from 200 to 2,000 rotations per minute. It was found that at speeds exceeding 2,000 rotations per minute a shattering action was likely to occur in the bearing which quickly destroyed it. This action was especially noticeable at 5,000 rotations per minute, and above. The balls and races were destroyed by first becoming pitted, the pitting occurring in both. With heavy loads the balls failed by shearing into two parts. Any lubricant reduces the tendency to heat and shatter, but oil is better than grease.

Calculations from the figures taken during the test gave the coefficient of friction to be .00475, or less than one-half of 1 per cent.; though in a few of the tests the figure was found to slightly exceed one-half of 1 per cent. The friction was slightly greater with the smaller balls and at the higher speeds.

ELECTRIC VEHICLE IN THE FLOWER PARADE.

BARONESS DE ZUYLEN IN THE FLOWER CARNIVAL.

PLACE ST. MARTIN, VESUBIE, DURING THE LUNCHEON OF THE TOURISTS.

The Nice Events.

The first of the events of the Nice week took place on Sunday, March 29, under a cloudy sky. It was the automobile flower carnival or flower parade which each year arouses such a widespread interest among the patrons of the resort. The photographs herewith show a number of the vehicles which received prizes. The first prize was won by Mr. Warden, an American, who drove a Panhard. Among the other prize winners was the Baroness de Zuylen, wife of the president of the A. C. F., who is shown in one of our photos.

The brake contest, which was scheduled for March 28, was postponed until April 4, owing to the bad weather.

Among the events of the week was a long distance touring contest or endurance contest, which took place on March 30 and 31, and comprised runs of 160 and 188 miles the first and second day, respectively, the start and finish being at Nice both days. The series also comprised a short distance touring contest in the vicinity of Nice. In both these contests there were a number of vehicles which were offered for sale by their owners. They were to be sold to the highest bidder within twenty-four hours of the contest, the offers being sent in a sealed envelope to the secretary of the Automobile Club of Nice. The entrance fees were $8 and $4 for the long distance touring contest and the short distance contest, respectively. The itinerary of the first day of the long distance touring contest was as follows: Nice, Escarene, Col de Braus, Menton, La Turbie, Levens, Saint-Jean-la Riviere, Saint Martin-Vesubie, Saint-Jean-la Riviere, Vesubie, Charles Albert Bridge, Saint Jeannet Vence, Chateauneuf, Villeneuve, Loubet, Nice. This total distance is 257 kilometres, or about 160 miles. At Vesubie the contestants in the long distance touring contest met with the participants in the short distance contest, who made a halt at that place. The itinerary of the second day was as follows: Nice, Grasse, Saint Vallier, Seranon, Comps, Montferrat, Draguignan, Le Muy, Le Duc, La Garde Freinet, Sainte Maxime, Frejus, Cannes, Nice. This day's run was 300 kilometres, or 188 miles in length. A new classification was introduced, vehicles having single cylinder and two cylinder motors being classified in category A, and vehicles with three or more cylinders in category B. Only touring cars proper, with seats for at least four persons, were admitted in category B, and vehicles with comfortable seats for two persons and a complete body in category A. The start was given both days before the clubhouse of the Automobile Club of Nice, 5 Boulevard Gambetta, between the hours of 5 a. m. and 9 a. m., at the option of the contestant.

Speed did not count in this contest, but all vehicles which did not complete the whole journey within the maximum time limit were disqualified. In connection with the long distance touring contest there were a number of hill climbing con-

ne the first day at the De Braus Hill ne the second day on the Saint Val-ill. All the contests were of an atory character, and every vehicle completed the whole course and sat- all requirements received a prize ting of a piece of art and a certifi- A number of controls were estab- along the route, and the time of ehicle was taken at each control.

owing is a list of the starters in this t on March 30: Stead (De Dietrich), Lubecki (Mercedes), Garin (Ro-chneider), Thorand (Gladiator), Mar- (Rochet-Schneider), Desjoyeaux ult), Jolliot (Rochet-Schneider), (Germain), Rouff (Rochet-Schnei-Jack (Mercedes), Sportsman (Mors), (De Dion).

of these, with the exception of Jack lanc, completed the course within the limit, but Thorand and Sportsman disqualified for having exceeded the limit in climbing the Col de Braus. ollowing completed the run the sec-ay and thereby qualified for a di- : Stead, Lubecki, Garin, Desjoyeaux, and Rouff. The special prizes for mbing were awarded to Lubecki (1), (2), Jolliot (3).

he short distance touring contest all of vehicles were admitted and none formalities observed in the long dis- contest were carried out. The took place from the premises of the obile Club of Nice on March 30 and tween the hours of 6 a. m. and 9 a. the option of the contestants. The s were required to follow the pre- l itinerary, but any stops en route did unt against them. They were con- only at the start, at the finish and noon control. The first day the ontrol was at Vesubie, 26 miles from and the second day it was at Dra-n, 62 miles from Nice. The total e covered the first day was 80 miles, e total distance covered the second 25 miles. The participants who cov-e complete course received a bronze These touring contests seem to roused much less interest than the for the total number of entries in the istance contest was only twelve, while short distance contest there were wo entries.

April 1 the La Turbie hill climbing as begun. There were fifty-seven in this contest and thirty-two entrants presented themselves at the g line. The first to start was Hie-s in a 60 horse power Mercedes, omplished the trip of nearly 10 miles . 26s., beating the previous record. s followed by Werner (Mercedes), time was 14m. 45 4-5s., and Degrais edes), 16m. 56 2-5s. Then the ill Zborowski started, with the result known.

n representations made by the Auto- Club of France the authorities at econsidered their action in prohib-he races on the Boulevard des Anglais, and the event took place on Tuesday morning, April 7. Very severe measures were taken by the police to prevent any accidents to spectators, and they were not even allowed on the sidewalk of the boulevard. M. Serpollet won in the kilometre flying start race, his time being 29 1-5 seconds, against 29 4-5 seconds last year. He won the Henri de Rothschild prize. In the mile races from standing start Mercedes machines won. In the first heat a Mercedes, driven by Mr. Brown, made the mile in 63 seconds, and in the second Hieronimus was the winner. The time was taken with the new Mors timing apparatus.

While last year Serpollet's time in the kilometre race was a record, he this year failed to attain the speed record established

SERENADING THE TOURISTS AT VESUBIE DURING LUNCHEON.

"EN PANNE" ON THE DE LA RAYA HILL.

ZBOROWSKI'S CAR AFTER THE ACCIDENT.

by Augieres in a Mors machine on the official straightaway of the A. C. I. It is claimed that he did not dare to use full power, fearing another fatality.

The Gordon Bennett Cup Race.

A special committee of the A. C. G. B. and I. has recently been over the route of the race in Ireland, and Claude Johnson, secretary of the club, gives some interesting particulars of the route and of the details of the race in a late number of the *Automobile Club Journal*, from which we abstract the following:

No doubt the racing cars will be in Ireland for some weeks before the event, for although their use on the course is prohibited they might be run at reasonable speeds on the straight, hedgeless roads north of Dublin. The officials of the clubs and of the county councils will be engaged for some days before the race in staking out the road into a number of sections, and numbering them so that those charged with keeping the course clear may have no difficulty in recognizing the section with which they are concerned. They will also be occupied with the erection of signal flags.

It has been suggested by the races committee that only two sorts of flags should be used, a green flag for "go slowly" and a red one for "stop." Mr. Johnson will suggest, however, that a large green banner be suspended 300 yards ahead of the point at which caution is necessary, a small green flag 140 yards ahead of that *point, and that* if it is necessary to observe slow speed for a considerable distance, for instance, in passing through a long village, the distance over which slow speed is necessary should be indicated by the number of small flags. By this means the driver will at once know over what distance slow speed is to be observed. Another suggestion to be submitted to the races committee is, that the green flag which is to be suspended 300 yards before the begining of a control should be half green and half red, to notify that it is a slow down preparatory to a stop, as opposed to a green flag, which will indicate a slow down preparatory to the zone in which it is necessary to observe slow speed.

It will be necessary beforehand to have posts erected to which the official clocks may be affixed; small tents erected in which the timekeepers may sit; blackboards erected on which the official times may be shown, and the road marked to show the space within which the cars must be brought to rest.

It is possible that arrangements may be made by which a week or so before the race the club may run a special boat for the transportat of cars, starting from London Docks, and calling possibly at Southampton, Bristol, Liverpool, Holyhead, and taking up cars at these ports, and then proceeding to Dublin, and afterward plying between Dublin and Holyhead.

EXHIBITION OF CARS IN DUBLIN.

From Tuesday evening, at 4 o'clock, until the evening of Wednesday, July 1, at 4 o'clock, it is hoped that the cars participating in the race may be exhibited to the public in the motor store which has been secured by the Irish Automobile Club. No doubt the drivers and mechanics will wish to be at work upon their cars, but there is nothing to prevent this work being carried out in the presence of the public, and, naturally, the presence of the cars in the exhibition building will attract the public.

On Wednesday, July 1, the weighing of the racing cars will also take place. The club officials will beforehand have obtained an official certificate of the accuracy of the scales in Dublin, and the scales at Curragh on which the cars will be weighed.

The racing cars, with their drivers and mechanics, will probably leave Dublin early in the evening of Wednesday, and proceed to quarters near the start. Possibly tents will be erected behind the club enclosure for the reception of racing cars.

In the small hours of Thursday morning the members of clubs who have undertaken to act as stewards of the course and others will be leaving Dublin, some by special trains, others by car. The road will be cut up into sections which will be shown by numbered stakes. Every steward will be supplied with a map showing the particular portion of the road for which he is responsible. He will take up his position and at once take steps to keep the course clear in his section.

The head officers of the course, each responsible for about ten miles, will be kept informed of what is taking place over the whole 10 miles by means of messages brought by motor cyclists. Club members who have driven their cars onto the course will place them at crossroads, to strengthen the barriers already made by representative of the county councils.

At 6 a. m., therefore, when access to the route by vehicles of all sorts is absolutely stopped, the road throughout its 80 miles of length should not have on it a single vehicle, person or animal, each section of the road being kept clear by the stewards, who will all be wearing the special badge which is being prepared for the occasion, and the green brassard on their arms.

At the controls the international timekeepers will be at their posts, and the international observers will be taking up their places within the controls to see that the rules are adhered to. The approaches to the controls will be kept clear of the public by police. Buglers will be at their stations in order to signal the arrival of cars, and motor cyclists will be in attendance at the inward controls in order to ride in front of the racing cars through the controls.

THE PILOT CAR.

At 6:30 a. m. the racing car which in the eliminating trial proves to be the second best will start from the club enclosure and will drive completely round the course. It will carry large labels bearing the word "Pilot," and the public, having been given to understand beforehand by notices and by means of the press that the racing cars might follow within half an hour or less,

alize the danger of walking on the ys, and will be prepared for the ad- the racers.

THE START.

start will take place on a slight gradient, situate about 100 to 200 south of the club enclosure, so that n the club enclosure and in the pub- losure will have an opportunity of the cars starting.

Edge, as the holder of the cup, on en Napier car No. 1, will start first. arter will give the word to start, in hand, by counting the seconds: n seconds, ten seconds, five seconds, conds, three, two, one. Go!" The 1 front of the club enclosure will ly be treated with tar in order that t may be raised. Scarcely will the of the exhaust of Mr. Edge's car ied away before the starter will be 1 in starting Rene de Knyff, on the ench car No. 1, built by Panhard- or.

e Americans challenged before the s, the third car to start will be a ored American car. The fourth car will be a white colored Mercedes ssibly driven by Baron de Caters. h car will be the British car No. 2, colored Napier, driven by Charles

The sixth car will be the second ench car, built by Panhard-Levas- l driven by Maurice Farman. The car will be the American No. 2. hth car will be the second German es, probably driven by M. Degrais. th car will be the third British car green, which may be a Star car, by Mr. Lisle, Jr., or a Napier car, by Mark Mayhew or Mr. Holder. th car will be the third French car,

The eleventh car will be the third n car, and the twelfth car will be d German car, another white Mer- As the cars will be started at two ntervals, this last car will be started

THE RACE.

ars on leaving the starting point, versing about two miles northeast- ill turn to the right up a steep hill Old Kilcullen, and from thence they ceed toward Carlow, from Carlow and from Athy back to the start- t, a distance of about 47 miles. As sing the eastern half of the figure be necessary for the cars to pass three controls, the spectators at enclosure may have to wait half before the first car round passes enclosure. Arrangements may be which each car as it passes the closure will be timed electrically hort portion of the road in order se in the enclosure may know the miles per hour at which each car he enclosure. The time occupied car in completing each half of the ill be put up on the official time o that those in the enclosure may glance how the race is progressing.

The cars after passing the enclosure a second time will be stopped momentarily at the corner for Old Kilcullen, and will be handed a card which will show that they are then to proceed over the western half of the figure 8, a distance of about 56 miles, including a 2 mile control at Kildare, and a short control at Athy. As regards the directions to be given at this momentary stop at the north end of the Athy-Kilcullen road, as to whether a car is to go straight on for the western half of the figure 8 or to turn to the right for the eastern half of the figure 8, it is suggested that on the card to be handed to the driver the half of the 8 which is next to be ridden over should be colored; and, further, that by the number of rings shown in each half of the 8 the driver may see at a glance how many times he has been round the course.

THE WORK OF THE STEWARDS.

Those who undertake to act as stewards on the road will be instructed not to relax

GORDON BENNETT CUP RACE COURSE.

their efforts to keep the crowds off the road so long as the race is being run. It is even more important that the crowd should be kept back toward the close of the race than at the beginning, because there is nothing more trying and agitating to a tired driver than to see in front of him the road blocked by people. His anxiety as to whether they will clear out of the way before he arrives in the middle of them cannot fail to be intense and most trying.

With such a large circuit, members and the public may be at a loss to know where to congregate to view the race, unless some special spot is fixed upon as the place where everything of interest will occur. Undoubtedly the Curragh will be a fine place from which to see the race; at the same time, the cars will pass the Curragh only half as often as they will pass up the Athy-Kilcullen road. Furthermore, the cars will be going up hill along the Curragh. The club enclosure will therefore be fixed at a point on the Athy-Kilcullen road, which may be easily reached from Kildare station. On one side of the road, in a large meadow, there will be erected a tent, and in front of this there will be a large lawn covered with seats and chairs. The lawn is raised considerably above the road, and when certain trees have been cut down it will command a very fine view of the cars coming down the slant, and cars should be seen at their best speed along this piece of road. The lawn will be approached through private grounds, having a lodge and drive on a side road. The proceeds of the enclosure are to help the club to defray the very heavy expense to which it is being put in connection with the race. On the other side of the road opposite the club enclosure there will be a public enclosure, also under the control of the club, to which the public will be admitted on presentation of tickets, which will be purchasable in London and in Dublin.

Possibly Lady Dudley will consent, if properly approached by the club, to present at the finish of the race a wreath to the winner, and suitable souvenirs to the other competitors in the race. The finishing point of the race will be at the club enclosure.

As it is very often somewhat difficult to read at a distance the numbers of cars if they are painted on honeycomb radiators, Mr. Johnson will suggest to the races committee that there should be affixed to the dashboard of each car a flat piece of iron about 8 inches high and 3 inches wide so as to stick up above the dashboard, and to be colored the same color as the car. Car No. 1 of a nation would have one of these slips; Car No. 2, two; Car No. 3, three. With a glass, therefore, it would be possible at some considerable distance to know which car it was which was approaching.

A. C. A. Affairs.

The Automobile Club of America held a smoker last Saturday, when a varied and interesting program was presented.

The following new members have been elected: Active—Herman B. Duryea, H. M. Crane, F. C. Armstrong, F. Gebhard, the Duke of Manchester, H. P. Haggerty, Temple Bowdoin, Frank A. Munsey, Albert Lemaitre, R. L. Beekman and William B. Mack. Associate—John S. Cox, J. H. Lindsay, William Thaw, Kirk La Shelle and A. W. Comstock.

President Shattuck has been authorized to appoint a committee of three members to confer with a similar committee of the National Association of Automobile Manufacturers on the chauffeur question.

N. A. A. M. Matters.

STANDARD LAMP BRACKETS.

The committee appointed by the N. A. A. M. to investigate the question of standardizing lamp brackets made its report to the executive committee at a recent meeting.

The committee explained that it had communicated with the various automobile manufacturers, asking them for an expression of opinion as to the best form of bracket for oil side lamps and for acetylene headlights. The replies to these inquiries and a full consideration of the matter re-

sulted in the following recommendations by the committee:

1. For oil side lamps, the form of bracket shown by sketch (Fig. 1). This bracket may be made any shape the lamp manufacturer may elect, provided the portion of bracket which fits the lamp prop is made in accordance with the dimensions shown on attached sketch.

2. For the large or small acetylene headlights, the style lamp bracket shown by accompanying sketch (Fig. 2), and we advise the standardization, as nearly as possible, of the distance between the centres of these lamp brackets as shown.

These recommendations were adopted and it was ordered that the information be sent to active members and lamp manufacturers, together with blue print of the standard lamp brackets.

W. D. Gash, of the Searchmont Automobile Company, Philadelphia, Pa., was elected a member of the executive committee at its meeting on April 1, in place of Lucius T. Gibbs, resigned.

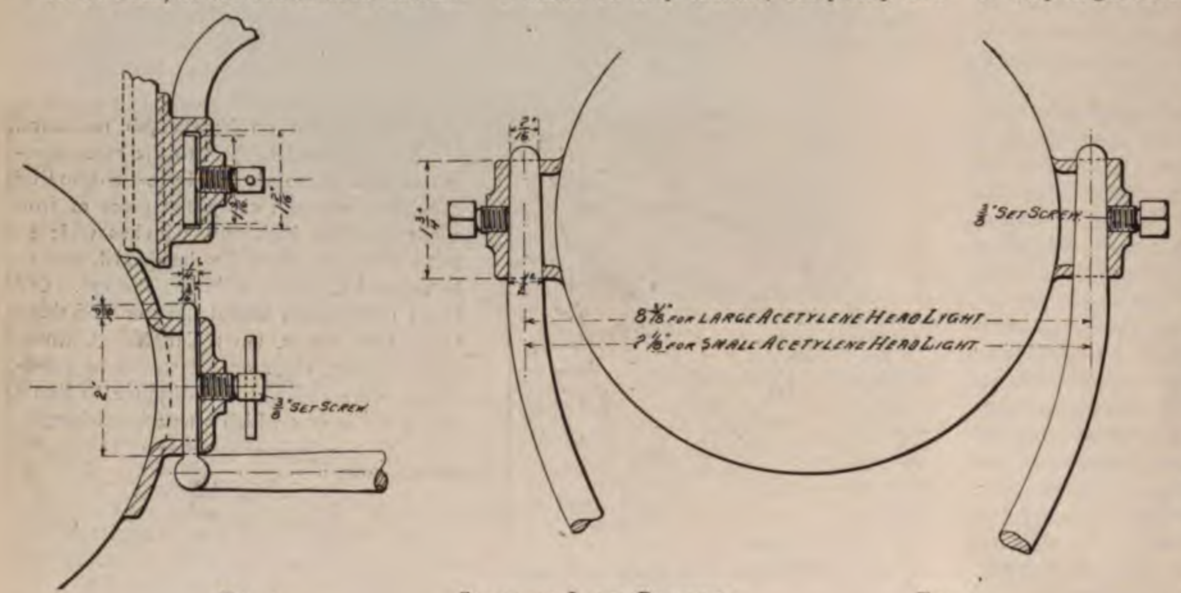


FIG. 1. STANDARD LAMP BRACKETS. FIG. 2.

Club Notes.

NEW CLUBHOUSE OF THE LONG ISLAND A. C.

The Long Island Automobile Club is entering the fourth year of its career in a new home at 32 Hanson place, Brooklyn. After two weeks of extraordinary effort the members have transformed what was but lately a typical machine shop into as cosy and promising a home of social intercourse as one could wish for. A well appointed garage is connected with the clubhouse. This is the third club that has added a garage, but the first in the metropolitan district. The other two are in Massachusetts and Chicago, respectively. In every way the club's home is finely appointed, and the work has but begun, according to the plans of the house committee.

The building is of two stories, 25x65 feet. On the ground floor is the office of the garage and the garage itself. It has accommodations for ten cars as regular occupants of space, but there is room for twenty-two crowded. A man is always in attendance and all repairs and attention a car needs are given. There are none but members' cars admitted and the charges are much less than would be made in a public garage. This department is run on a basis that insures only the payment of the rent for the building. After a man has paid what would be his pro rata share of the rent there is no further cost for that month.

On the second floor is the clubhouse. The furnishing is in the old Dutch style and much like that of the A. C. A. clubhouse in New York city. In the front of the building is an office which is on a raised platform, which also serves the purpose of a stage when entertainments are given. Then there is the general assembly room, which is divided into what might be called a series of cosy corners, completely and handsomely furnished. An open fireplace adds greatly to the general effect with the red and green walls and upholstery. A pool table affords amusement to the lovers of the game and a piano pleases the musical. A well appointed kitchen with chef in command offers every advantage to the inner man and a pretty grill room is a valuable adjunct. The ladies are also well cared for in the general plan of the house.

The formal opening of the new club house will take place tomorrow evening. For this reason the meeting, which falls on the same date, will be omitted. The club's April calendar is as follows: 11th, informal opening, for members only; 12th, club run to Amityville; 15th, board of governors' meeting; 16th, formal opening reception for members and their friends; 19th, moonlight run to Holly Inn (Fernhurst); 22d, club meeting; 26th, club run to Tottenville, Staten Island; 29th, board of governors' meeting.

The club was organized in 1900, and was the first to promote an endurance contest over a 100 mile course. It also held the first race meet in the metropolitan district The officers are O. R. Adams, president; Lawrence Abraham, vice president; Edwin Melvin, secretary; Read Halliday, treasurer. The board of governors consists of F. G. Webb, L. W. Hopkins, J. Adolph Mollenhauer and Lawrence Abraham. A vacancy on the board will be filled at the next meeting.

The first banquet of the Dayton Automobile Club, which is claimed to be the first of its kind in Ohio, was held on April 8. The table decorations were suggestive of automobiles, and the menu was styled "autoeat." The edibles were listed in automobile terms as follows: Hot Spark, Muffler—Cut-Out, Slow Gear, Radiators, Pinchers, Nuts, Dynamo—Apple Juice, Wire Terminals, Liquid Anti-Freeze, Sheet Rubber—Jiffy—Tire Plugs, Condensed Gasoline, Case Hardened Bearing Balls, A Very Light Lens Reflector, Roast Flywheel — Steering Gear, Lubricators, Graphite, Dry Cells, Arctic Grease, Assorted Tools, Rat-Tail Files, Rubber Cement, Asbestos Board, Cylinder Oil. The post prandial exercises consisted of the following toasts: "The Club," by President Carl Baumann; "My Trip Around the World," by Dr. W. W. Ensey; "Sign Posts," by George Andress; "Autos versus Traction Cars," by Col. E. C. Strong; "Ignition," by V. G. Apple, and "The New Number," by W. H. Ogan. The following named gentlemen were elected officers for the year: Carl Baumann, president; Dr. A. F. Bowman, vice president, and George Andress, secretary and treasurer. Club runs have been arranged as follows: April 16, to Osborn, Ohio; April 23, to Germantown, April 30 to Middletown, May 7 to Piqua, May 14 to Franklin, May 21 to Springfield, May 28 to Lebanon, May 30 to races at fair grounds, June 4 to Troy, June 11 to Xenia, June 18 to Brookville, June 25 to West Milton, July 2 to Bellbrook, July 4 to Richmond, Ind.; July 9 to Tippecanoe City, July 16 to Farmersville, July 23 to Yellow Springs, July 30 to Ludlow Falls, August 6 to Lewisburg, August 13 to South Charleston, August 20 to Eaton, August 27 to Jamestown, September 3 to Covington, September 10 to Wilmington, September 17 to Hamilton, September 24 to Urbana, October 1 to Greenville, October 8 to London, October 15 to Washington C. H., October 22 to Cincinnati, October 29 to Columbus, November 5 to New Carlisle.

At a special meeting of the Automobile Club of Minneapolis, on April 2, the matter

ulations for the speed of vehicles was sed and the club put itself on record ng opposed to speedy and reckless by the passage of a motion, which nd to keep members from running chines so as to endanger life or limb. lub member who is known to have uilty of this offense shall be reported secretary of the club, who shall the member of the charge. On the complaint the matter shall be it before the board of governors, and third complaint the member shall be ed. Club caps, which will be either her or waterproof silk, and bear the ram of the club, were adopted. It is e intention to designate the autos of embers either by the club monogram er design. As soon as the roads are pe the club will begin its country The club now has a membership of twenty-five new members having lected at the last meeting.

Massachusetts Automobile Club, of , and the Boston Automobile Deal-ssociation have decided to hold an obile meet at the Readville track on 30. The committee representing the onsists of George R. Alley, Fred Tu-d G. W. Beale, while the dealers are ented by Harry Fosdick, George A. and Mr. Marvel.

he annual meeting of the Automobile of Maine, Portland, officers were for the ensuing year, as follows: ent, Thomas J. Foster; vice presi-Henry R. Stickney; treasurer, George wyer; secretary, Howard Winslow; ive committee, the above named offi-id Henry M. Jones, Herbert A. Har-Maynard D. Hanson and Curtis H. ds.

ibers of the Automobile Club of port, Conn., dined heartily at their nnual banquet on April 6, judging copy of the menu sent us. Begin-with "starting crank" caviar, "hot oyster cocktail, "sliding geared" "friction clutch" boiled salmon, fol-24 horse power pommes duchesse, steering" tomatoes, "blow off" ets, roast turkey "with detachable rum punch "lubrication," "slow Philadelphia squabs, and "legisla-obster salad, they ended with "air ' Macedoine jelly, "bolts and nuts," drive" raisins, saltines "with water ," "Edam spark plugs" and coffee inders." We trust that none of the rs began as "starting cranks" or by becoming "easy fruit" to "police straws." The menu was also illus-with an oil can, monkey wrench and e can, accompanied with mottoes. S. tler, secretary of the A. C. A., was st of the evening.

Automobile Club of Vermont was ed at a meeting held at Montpelier rch 26, with the following officers: ent, D. L. Hazen, of Burlington; esidents, W. B. Fonda, of St. Al-and C. C. Warren, of Waterbury; secretary and treasurer, W. D. Woolson, of Springfield; executive committee, C. A. Harris, of Brattleboro; J. F. Ruggles, of West Burke; Harry E. Speare, of Burlington; R. W. McCuen, of Vergennes, and J. J. Williams, of Montpelier; together with a large membership committee. A committee consisting of the officers was designated to draw up a set of by-laws. The next meeting will probably be held at White River Junction during the summer months.

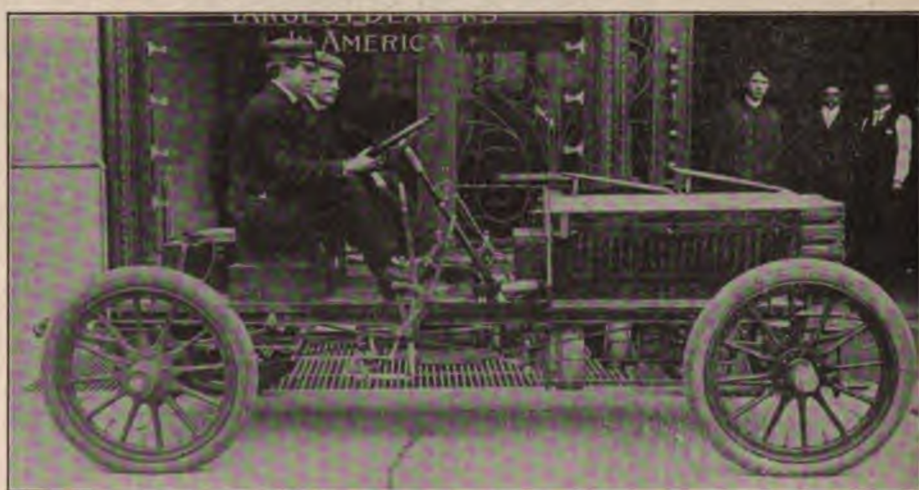
The Elimination Test for the Gordon Bennett Cup Race.

After four months of carefully laid plans and the most profound secrecy possible the Automobile Club of America yesterday succeeded in holding the preliminary trials in the elimination contest for the selection of two members of a team of three to represent this country in the international race in Ireland, which starts on July 2. There were but two cars at the test, a Winton and a Peerless, operated by Percy Owen and L. P. Mooers, respectively. Mooers had considerable hard luck on his way to the course and after he arrived, so that he was unable to give an exhibition satisfactory to himself. En route to Garden City, L. I., where the tests were held, the gasoline tanks of his 80 horse power car sprung a leak and he lost much of his gasoline. Then he was compelled to use the gasoline that he started out with in his 40 horse power car, which he also took to the course, and thus found himself in a plight from which there was no means of extricating himself, as there was no gasoline at the garage attached to the Garden City Hotel, the rendezvous.

When he was called upon to make a test he went over a 6 mile course, running the last half of the last mile without any gasoline, in 8 minutes and 41 seconds. Percy Owen was in much better form, and was able to cover a 5 mile course twice, each time with a flying start. The first trial was made in 5 minutes and 55 seconds, and the second in 6 minutes and 55 seconds, according to unofficial authority.

The course was a 6 mile stretch of fairly good level road, from Westbury to Merrick. It is narrow and macadamized, and has in it one sweeping turn. Six roads cross it, but only one of them is used much, and at this people were stationed to warn pedestrians or drivers of danger. The start of the first trial was made about 6 o'clock a. m., and the last one was finished a little less than two hours after.

In each of the trials a member of the committee in charge of the event rode with the candidate. There was nothing like a contest, with the two cars on the road at one time. The candidates were called upon to go into details with the committee as to the points of their cars, and the method of running them was also taken into consideration. These matters are expected to have more weight with the committee in making its selection than mere speed at this trial. The heavy rain that fell shortly after the start had a dampening effect, and many features of the trials that will have important bearing on the question of selection were postponed until this morning.



FORTY HORSE POWER PEERLESS RACER.

When the committee, consisting of George Scott, Dave Hennen Morris and Secretary Butler, of the club, with Henry Opdyke, the official surveyor of the club, arrived they were shocked to find themselves surrounded by a crowd of newspaper men, who were supposed to have been eluded, but who followed the contestants in hacks, automobiles and trains. The committeemen were displeased, but made the best of it.

Considerable speculation was heard as to what would likely be done in the matter of H. F. Harkness' car. It was not present at the test, the excuse being given by Harkness' friend that this was because that gentleman had not been notified. There is said to be some feeling against the committee in this matter, but the members deny that they have failed in any way to give Mr. Harkness a fair trial. They refused to discuss what would be done in the event

of the failure of Mr. Harkness to appear this morning.

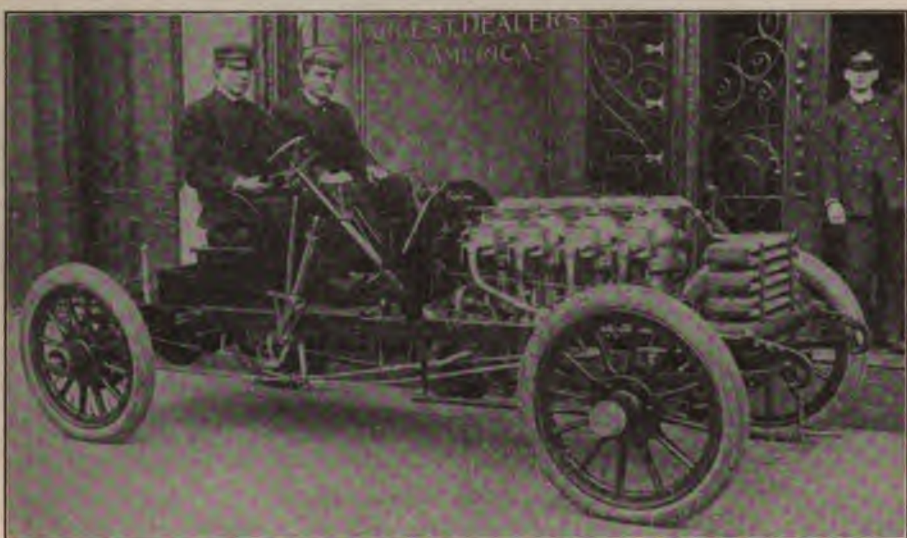
All questions concerning C. W. Matheson, of Grand Rapids, who said he was building two cars to take part in the test, were settled when the committee announced that he was out of it for having failed to put in an appearance. They decided that they could not excuse any delays at this time.

One of the pieces of ill luck that befell Mr. Mooers was his arrest while on his way to the course in company with C. G. Wridgway. The latter gentleman operated the smaller car. They were riding along near Mineola at about 18 miles an hour when two constables held them up and charged them with speeding at the rate of 29 miles an hour. They were taken before a sergeant of police, and after giving their names and their words that they would appear in court this morning were released. Soon after that the gasoline tank broke.

The Winton racer, concerning which the most absolute secrecy has prevailed because of new features it was said to contain, was dismantled here yesterday afternoon for adjusting purposes. It was seen to have four horizontal cylinders disposed crosswise in the lower part of the body. The exhaust pipes on the lower part of the engine have only 7 inches of clearance from the ground. One radical departure is the use of a bevel gear drive direct to the differential on the rear axle. A clutch of the Renault type is used. The wheels are 34 inches in diameter and have 4 inch tires.

L. P. Mooers, of the Peerless Motor Car Company, Cleveland, has built two machines for the Gordon Bennett Cup race, one a 40 horse power and the other an 80 horse power. Both of these are illustrated herewith, with Mr. Mooers at the wheel. The high powered machine weighs about 2,200 pounds, which is the limit allowed by the racing rules, and the other weighs 300 or 400 pounds less. The 80 horse power machine has an exceedingly long wheel base and is equipped with 34 inch wood wheels and 4 inch tires. It is the intention to take both of the machines to Ireland and test them there on some of the byroads to determine the relative speed on curves. If it should be found that the machine with small wheel base can safely be run considerably faster on the curves than the high powered machine, it may be used in the contest. Following are some further particulars regarding the 80 horse power racer.

The engine has four cylinders of 6 inches bore and 6 inches stroke. Both touch and jump spark ignition are fitted. The change gear gives four speeds forward and one reverse, and is controlled by a single lever. The transmission to the rear axle is by bevel gears, and the drive is direct on the high speed. The gasoline tank has a capacity of 40 gallons. The engine is fitted with automatic governor and accelerator. The frame is built up of channel steel. It is the intention to take the machines back to Cleveland and run them there on the track from 50 to 100 miles a day. Mr. Mooers hopes to be able to trim down the weight of the heavier car about 200 pounds.



Eighty Horse Power Peerless Racer.

A Belgian reliability contest, known as the "Circuit Nationale," will be held May 9 to 14, the following being the itinerary: Brussels to Antwerp, Liège, Arlon, Namur, Charleroi, and back to Brussels. A special "selling" class will be included, and also hill climbing trials, a kilometre race, etc. The Belgian "Circuit des Ardennes" race will be held June 20 and 21. The first day a contest of the touring cars, voiturettes and motor bicycles will take place, the route of the circuit (92 miles) being: Arlon, Bastogne, Champlon, Saint-Hubert, Neufchateau, Habay, Arlon. This will be covered twice. On the second day the big cars will compete, starting from and returning to Bastogne, the distance for these being 320 miles.

MINOR MENTION

E. T. Munger has secured the agency for the Cadillac automobile in Green Bay and De Pere, Wis.

The Michigan Automobile Company, of Kalamazoo, Mich., has named its new machine "The Michigan."

The first automobiles made by the Standard Wheel Works, Terre Haute, Ind., will be ready for shipment about May 1.

L. C. Burkitt and others are interested in a new stock company to carry on a wholesale, retail and repair automobile business at Waterloo, Ia.

At a special meeting of the stockholders of the Kidder Motor Vehicle Company, New Haven, Conn., on April 1, steps toward a voluntary dissolution were taken.

J. M. Swanson, of Rolfe, Ia., is said to have a project well under way for the organization of a company, with a capital stock of $10,000, for the manufacture of automobiles.

At the annual meeting of the stockholders of the New York Transportation Company, in Jersey City, on April 6, George H. Day and Philip T. Dodge were elected members of the board of directors in place of J. E. Hayes and H. L. Zabriskie.

E. W. Roberts has resigned as mechanical engineer of the Elmore Manufacturing Company and will again take up consulting engineering with gas and gasoline engines and gasoline automobiles as specialties. His address for the present will be Clyde, Ohio.

The Engineering Agency, Monadnock Block, Chicago, makes a specialty of supplying competent help to engineering and manufacturing firms. They keep a register of technical men looking for positions and state that during the last two years the registrations have exceeded 3,000.

The Wisconsin Association of Automobile Manufacturers was organized at Milwaukee on April 3. E. W. Olds was elected president and W. J. Merkel secretary and treasurer. Plans for the automobile show to be held at the Broadway Armory in Milwaukee the first week in May were discussed.

Automobiles were extensively used in the recent municipal election by the members of the Chicago Automobile Club, who actively opposed the re-election of Alderman Honore Palmer, who was once the president of the club and who antagonized the members by introducing an automobile ordinance in the city council.

The "English Steam Wagon Company" was recently formed to take over the interests of the Mytholm Steam Wagon Company, of Hebden Bridge, Yorkshire, England. Their works are owned by the firm of Messrs. John Pickles & Son, engineers of

ion as makers of wood working ma-. The English Steam Wagon Com-will exploit the patents of Arthur mann in that country.

& Davis, Amesbury, Mass., have a New York office at 83 Chambers with Frank F. Weston as selling

rding to a report a company with a of $1,000,000 will be formed to op-line of 300 or 400 automobile 'buses Louis during the Fair.

thought probable that the Salisbury and Manufacturing Company, of own, N. Y., will remove to Batavia. business includes the manufacture of bile wheels.

Kinsman Electric and Railway Sup-mpany, of 91 Liberty street, New carry in stock a special flexible, insulated cable for wiring gasoline biles using high tension ignition.

Olds Motor Works are sending out t replica of their light vehicle. The has a 5 inch wheel base, and wheels es in diameter, with rubber tires. are also the equipments of steering control handle and accelerator.

. Martin has opened up an automo-lesroom at 151 West Thirty-eighth New York, and has been appointed or the Grout steamers and the Cadil-soline cars. His territory includes lly the whole of New York State part of New Jersey.

k S. Macourek, formerly assistant ing agent of the Shelby Steel Tube Pittsburg, has been made purchas-nt of the Peerless Motor Car Com-nd F. V. Stuart Graves, recently of ff of the Syracuse *Herald*, has as-charge of the advertising depart-

Brisben Walker has been invited yor Low, of New York, to appear the Rapid Transit Commission to strate what he believes to be the w cost of transportation by auto-omnibuses as compared with that subway line, and to show that such e would not overcrowd the streets.

les of incorporation have been filed ny by the Black Diamond Automo-mpany, of Geneva, N. Y. The in-tors are D. W. Hallenbeck, E. J. nd a Mr. Rodgers, and the capital 000. William Dieter, formerly em-by the Searchmont Automobile ny, American Bicycle Company and neva Automobile Company, is the er of the company, which is to cture machines under patents grant-im a year ago. He describes his power as a "steam-hydrocarbon sys-nd says that the company has a t Geneva 200x150 feet, and that ing is in readiness to manufacture chines the first year. The first ma-ill be a runabout, either steam or e, and later attention will be given rias and commercial vehicles.

LEGISLATIVE AND LEGAL.

Massachusetts Automobile Bill Reported.

The Massachusetts automobile bill was reported on April 7. It limits the speed to 12 miles within and 20 miles without cities. Each automobilist must be registered with the highway commissioners, the fee for which is $5 for a carriage and $2 for a motor cycle; manufacturers are allowed to run motor carriages not sold or let out to private use under a general designating mark for their whole establishment, for a fee of $10; and no motor vehicle shall be operated without such registration, or by a person not licensed, after August 1, 1903. Licenses to operate are obtainable only after the highway commissioners have satisfied themselves that the applicants are capable.

The fee for a license to operate for hire is $3, for other licenses $2. Licenses for operators and registration of vehicles elsewhere allow the use of such machines in the State, but only under rules such as the Highway Commission may prescribe. Owners are prohibited from employing an unlicensed chauffeur and are made liable to punishment for any violation by persons whom they hire. One form of penalty allowed is revocation, or suspension of license or registration certificate, and if a person operates or allows another to operate his machine after suspension or revocation of its certificate he is liable to a fine of $200 or ten days in jail or both. Ordinary violations are punishable by a fine of not more than $200. The bill is now in the hands of the Ways and Means Committee.

On April 13 William Pugh was held in $500 bail for examination by Magistrate Cornell, New York, for speeding his automobile along Riverside Drive. Charles Little, a chauffeur, was held in $500 bail for speeding his automobile along Central Park West. John Henry, of Providence, R. I., was held in $500 bail for speeding his automobile along West End avenue.

At a meeting of the creditors of the German-American Automobile Company, of New York, on April 7, John C. Coleman was elected trustee.

The Commissioners of the District of Columbia have received a number of consular reports relating to restrictions in running automobiles in Europe, which, it is understood, will be studied with a view to the amendment of the District regulations.

John Bowles, chauffeur for J. M. Watson, Washington, D. C., has appealed from a fine of $25 imposed by Judge Kimball in the Police Court on April 3 for exceeding the legal speed limit. Bowles is also accused of being responsible for a recent collision with the automobile of Representative Sibley, of Pennsylvania.

E. M. Sunderland, corresponding secretary of the National Capital Automobile Club, Washington, D. C., has officially protested to the District Commissioners against the proposed numbering of automobiles and the passing of any additional legislation restricting their operation. He said that the club was preparing to take the matter to President Roosevelt, and that if any additional restrictions were placed on owners they would formally protest to Congress and inaugurate a campaign against such adverse legislation.

The Judiciary Committee of the Wisconsin Senate, after careful consideration of the bill framed by the Assembly Judiciary Committee as a substitute for the Moldenhauer bill, have unanimously decided to report it for indefinite postponement. The great objection is said to be that the bill if it should become a law would result in hardship to liveries which rent automobiles, because by holding the owner of the machine liable, irrespective of the negligence of the driver, and allowing the latter to escape, they would be driven out of business.

The Terre Haute, Ind., council have unanimously passed the automobile ordinance which was recommended by the Automobile Club. The license fee is fixed at $3 a year each and the speed limit to 8 miles an hour on paved streets, on Wabash avenue and three blocks on either side, 10 miles in other parts of the city and 6 miles in turning corners. The ordinance provides that the machines must carry a light within half an hour after sunset and until within half an hour of sunrise, and must be equipped with either a bell or horn to give warning of their approach. The penalty for violating the ordinance is a fine not to exceed $5. After the meeting there was an informal discussion about ruling out motor cycles altogether. There are four motor cycles and twenty-one automobiles in Terre Haute.

W. J. Stewart is reported to have severed his conection with the New Jersey Automobile Company of Newark.

J. C. Brandes, of New York, has secured the agency for the United States for Durkopp & Co., Bielefeld, Germany, manufacturers of automobiles, motor cycles, etc. He is also bringing over a sample Pipe car, which is made in sizes ranging from 20 to 60 horse power, and four of which are said to have been entered in the Paris-Madrid race.

The automobile of W. W. Jones, of Waynesboro, Ga., became unmanageable on April 8, and finally went over an embankment about 8 feet high, and was badly damaged. Mr. Jones was thrown out and sustained several bruises.

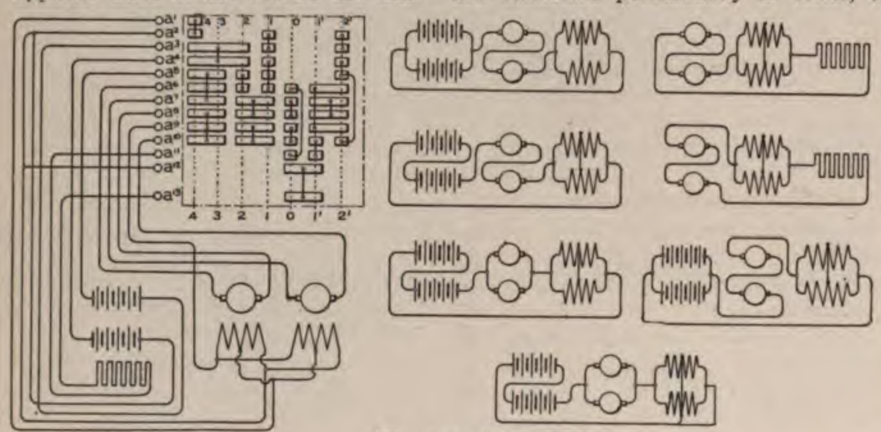
MOTOR VEHICLE PATENTS..

United States Patents.

724,021. Automobile Vehicle.—Hermann Lemp, of Lynn, Mass., March 31, 1903. Filed April 25, 1900.

In electric road vehicles, with separate motors for each of the driving wheels, two different systems of connections have been employed, one in which the motors or their armatures on the opposite sides of the vehicle have been permanently connected in multiple and the other in which they have been connected permanently in series, the required changes in speed being obtained in either case by the insertion of resistances or by changing the potential of the source, or both. Each of these systems presents certain advantages; but neither is by itself effective under all the conditions which may arise. When motors on opposite sides of the vehicle are connected permanently in multiple, they tend to resist any rapid change of direction, due to the fact that the torque of the motor or motors on the inside is increased during the turning of the vehicle, and consequently when it is attempted to turn a corner with the motors thus connected the wheels are likely to be skidded and strains produced on the steering handle that render steering difficult. On the other hand, with motors on opposite sides of the vehicle connected permanently in series an ideal arrangement is obtained for turning a corner. With this connection the torque of the motors is always equal, since they are supplied with the same current, and the speeds automatically adjust themselves. The motors operate in the same manner as a differential gearing, and the steering handle may be freely moved without danger of skidding the wheels or producing undue strains on the steering handle. When, however, the vehicle is running at full speed, it is a distinct advantage to have the motors on the opposite sides connected in multiple, for they will then resist any rapid change of direction and will therefore resist any quick movement of the steering handle, which would be dangerous at high speeds.

Since sharp turns should never be made at full speed, the advantages of both the series and the multiple connection without the disadvantages of either may be obtained by so arranging the contacts of the controller that whenever the controller handle is moved to a low speed position motors on opposite sides of the vehicle will be connected in series, and whenever it is moved to a high speed position they will be connected in multiple. Another advantage which results from such a system of connections over a permanent series connection, and which is especially marked when but a single driving wheel is provided on each side of the vehicle, lies in the fact that full power may be applied to the wheels on one side irrespective of the condition of the wheels on the opposite side. This is often of extreme importance, as, for example, when a wheel (or wheels) on one side becomes stalled by an obstruction in the road. If under such conditions the motors on opposite sides are connected permanently in series, the wheel (or wheels) on the other side is liable to begin to slip, particularly if it happens to be over a low or soft spot in the road, and since the co-efficient of sliding friction rapidly diminishes with the speed it will tend to increase in speed until the counter electromotive force of the motor connected thereto rises to such an extent that the current flowing through the motors is reduced to a very small amount, thus rendering it impossible to move the vehicle over the obstacle. With the multiple connection, however, the motors connected to the wheels which are stalled may be supplied with full current, irrespective of the conditions under which the motors on the opposite side of the vehicle are operating, and the supply of current is automatically regulated with reference to the needs of the motors.



No. 724,029.

The accompanying illustrations show the wiring connections and also the various connections effected by the controller in its different positions.

724,094. Incrustation Preventive.—R. L. Gamlen, of Bromley, England. March 31, 1903. Filed February 18, 1902.

In a previous application the inventor specified an improved method of cleaning boilers of scale, consisting in introducing into the boiler jute or other fibrous material reduced to the state of short fine filaments. He has since discovered that other kinds of non-vegetable fibrous material, such as wool, hair, silk and the like, animal fibre, asbestos and the like, inorganic or mineral fibre, in a state of division, such as that of short fine filaments, if introduced into the boiler, so as to become eventually distributed or dispersed throughout the boiler—will also prevent incrustation, or if the boiler be already incrusted the incrustation will be removed, the fibrous material in the latter case working underneath the incrustation and scaling it off.

723,502. Internally Fired Engine.—Elihu Thomson, Swampscott, Mass. March 24, 1903. Filed February 28, 1898.

723,503. Internally Fired Engine.—Elihu Thomson, Swampscott, Mass. March 24, 1903. Filed February 6, 1899.

723,540. Igniter Operating Mechanism for Explosive Engines.—Theodore C. Menges, Waterloo, Ia. March 24, 1903. Filed August 29, 1902.

722,243. Automobile Carriage.—William H. Noyes, Newburyport, Mass. March 100, 1903. Filed January 27, 1902.

722,259. Engine.—Frank H. Sleeper, Montreal, Canada. March 10, 1903. Filed July 18, 1902.

722,262. Motor Vehicle.—Roy Stone, New York, N. Y. March 10, 1903. Filed August 1, 1902.

722,309. Heating Feed Water for Motor Vehicles.—William J. Lane and George Lane, Poughkeepsie, N. Y. March 10, 1903. Filed January 29, 1902.

722,330. Low Water Alarm for Steam Boilers.—Freelan O. Stanley, Newton, Mass. March 10, 1903. Filed October 25, 1902.

722,339. Protecting Band for Pneumatic Tires.—John Wheeldon, Sheffield, England. March 10, 1903. Filed May 22, 1902.

722,432. Spring Spoke for Wheels.—Alphonse Prouvost, Tourcoing, France. March 10, 1903. Filed May 20, 1902.

722,466. Steam Generator.—John W. Sutton, New York, N. Y. March 10, 1903. Filed August 20, 1902.

722,612. Tire for Wheels of Road Vehicles.—Berne Nadall, Kingston upon Thames, England. March 10, 1903. Filed July 22, 1902.

722,629. Internal Combustion Engine.—Carl C. Riotte and Carlton R. Radcliffe, New York, N. Y. March 10, 1903. Filed September 11, 1902.

721,679. Magnetic Clutch.—E. R. Douglas, of East Orange, N. J. March 3, 1903. Filed July 28, 1902.

This clutch is designed to automatically adjust its friction surfaces for wear, and so that when the clutch is in engagement the magnetic circuit is not interrupted either by an air gap or non-magnetic material. The residual magnetism in this clutch has no effect on the disengagement.

THE HORSELESS AGE

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Reduction of Subscription Price.

We believe the time has come when a technical publication like The Horseless Age will find a wider field of usefulness at a more popular price, and we have accordingly reduced the domestic subscription price from $3.00 to $2.00 a year. Dating from January 1, 1903, subscribers at the old rate will receive a rebate in the form of an extension of their subscriptions—six months for yearly subscribers and three months for six months subscribers.

Notice to Advertisers.

Hereafter the first advertising form will be closed on Saturday and the second advertising form on Monday preceding the date of publication. Copy for new advertisements or changes of copy must be in our hands on or before Saturday in order to secure insertion in the succeeding number.

The Legal Aspect of the Gordon Bennett Eliminating Race.

Automobile laws are as yet very frequently misinterpreted, as is instanced by the impression held until recently that the present laws in New York and New Jersey would not allow of automobile races being held on the public highways of these States. The present Connecticut law gives local authorities the power to set aside the speed limit temporarily on any particular portion of the highway within their jurisdiction, for any special purpose, and it was thought that it would be necessary for the race committee of the A. C. A. to go to Connecticut to hold the eliminating trial for selecting the representatives of the club for the Gordon Bennett contest. The race was held on the public roads of New York State, however, as reported in our last issue, and with the permission of the local authorities, we are assured, who are said to be empowered to grant such permission by the passage in the State law which grants boards of supervisors the right to "adopt ordinances regulating the speed of automobiles or motor vehicles on the highways or streets of such county outside the limits of a city." It is hardly likely that this clause granting local option on speed limits was intended to legalize racing on the highway, but apparently it can be construed in that sense.

Pressed Steel Construction.

Running gear frames of pressed steel, or *chassis embouti*, as they are called in France, have received the approval of the leading European manufacturers, and would undoubtedly be employed much more extensively if their manufacture did not require such expensive mechanical equipment. The advantages of this form of frame construction—light weight, great strength and minimum of joints—are most appreciable in touring cars, and with this class of vehicle in particular the number made after a certain pattern is comparatively small. It is therefore not surprising that these frames are not at present used by any American manufacturer, and are not to be had on the American market.

Quite a number of firms are engaged in making pressed steel frames for railroad cars and trolley trucks, and some of these would undoubtedly gladly take up the construction of pressed steel frames for automobiles, if only a fair market could be found for any particular pattern. But this is almost impossible, unless standards are introduced by a body of manufacturers, say the N. A. A. M. It may seem a rather difficult matter for different manufacturers to adopt the same frame construction, but it is nevertheless quite feasible.

The French Automobile Trade Association standardized chassis over a year ago, and these standards have evidently proved quite satisfactory. The length and width of the frame are specified for the various classes of cars—voiturettes, light cars, etc. As in the majority of cases the machinery is supported by a false frame it is only necessary to adapt this false frame to the

main frame dimensions, which need occasion little difficulty.

Cold drawn seamless steel shells (pressed steel work) have been used for boiler shells and tanks for a number of years, and the question arises, why cannot such shells be used to advantage for cylinders of gasoline engines? There is a noticeable tendency away from the conventional method of engine construction by casting the cylinder proper and the jacket together. These castings frequently turn out porous, which necessitates their being thrown away after considerable machine work has been expended upon them, and they are also unnecessarily heavy. Pressed steel construction would lead to a saving in weight and other advantages if applied in the manufacture of such cylinders. The cylinders of racing cars are now frequently made of steel, but the problem of proper joints between the jacket and cylinder and the valve box and the cylinder seems to be still unsolved.

The Steam Turbine for Automobiles.

Steam turbines are now coming into extensive use for driving electric generators and for other purposes where their high speed is not objectionable. The use of such turbines for driving automobiles has undoubtedly occurred to many experimenters, but no vehicle so equipped has yet been produced. We learn, however, on good authority that a firm interested in what is perhaps the best known steam turbine at present is constructing a steam truck in which the motive power is furnished by a turbine.

The two features which distinguish the steam turbine from the ordinary steam engine are that it has no reciprocating parts and can therefore be perfectly balanced and that it runs at a tremendously high speed. It is also lighter and very much more compact than the reciprocating engine. The absence of vibration and the compactness would recommend this type of motor for automobile use, but these advantages are more than balanced by the enormous gear reduction that would be necessary if mechanical transmission was to be employed. Steam turbines for driving electric generators run commonly at 30,000 revolutions per minute, and as a truck wheel on city streets makes scarcely more than thirty revolutions per minute, a reduction of 10,000 to 1 would be required from motor to driving wheels. Gearing of such a reduction would be both cumbersome and inefficient. The high speed is essential to the steam economy of the turbine, hence the problem would not be solved by reducing the turbine speed.

These considerations point to the conclusion that the only practical method of transmitting the power of a steam turbine is the electrical method—that is, driving a generator by the turbine and sending the current generated by it into electric motors geared to the driving wheels. This method of transmission permits of the turbine being placed anywhere on the truck, and it would naturally be placed close to the boiler, with a view to reducing the piping and avoiding trouble from freezing. It must be patent to every close observer that in practically all present steam trucks, in which the engine is placed under the platform about the middle of the length of the truck, it is very inaccessible. The turbine and generator could be placed directly upon the platform in front, where they would not only be accessible but always in full view of the operator. The turbine truck referred to above will have electric transmission, with motors on the rear axle.

Proposed Universal Code of Automobile Terms.

A French publication suggests that a great service might be rendered the cause of automobilism by the formulation of a universal language of the sport and pastime, or rather a code of the expressions most frequently used in automobiling, and a congress under the auspices of the Automobile Club of France is recommended to provide ways and means for putting the project of formulating such a code into effect. The idea is to derive expressions for describing the features of a car and the troubles and derangements to which it is liable, the terms to be selected from the most suitable expressions in the leading European languages and to be modified to suit the requirements of universal use.

One of the important advantages of such a codified system of universal expressions would be the manner in which it would facilitate international automobile touring, which is rapidly extending in Europe; at least this advantage is expected by the originators of the idea. It is questionable, however, whether automobilists would deem it worth while either to learn the code or to carry and consult a book containing it, as much of the conversation necessary in touring does not relate to the automobile at all. It can hardly be conceived that a universal auto language would be of as much practical importance as a universal commercial language, and, as all the universal commercial languages that have been tried have failed in the end, a universal auto language would have no greater chance of success.

On the other hand, an international automobile dictionary, compiled with the approval of the leading national automobile clubs, would serve a practical purpose, inasmuch as it would tend to check the looseness of expression now prevailing, and definitely establish the meaning of different terms which are now used in varying senses. It is somewhat doubtful, however, whether the time has come for compiling such a dictionary, as the list of terms is still being added to very rapidly. Of course, the dictionary could be revised and added to from time to time and thus kept up to date.

The Obnoxious Clauses of the Bailey Bill.

The bill introduced into the New York State Legislature by Senator Bailey, the text of which was printed in The Horseless Age of March 25, passed the Senate on Friday, April 17, and only requires the signature of the Governor to become a law. The bill contains some provisions which are extremely objectionable to automobilists, and a storm of opposition has broken loose which promises to kill the measure before it can become a law.

According to this bill the speed limits in city and country are to remain the same as now, 20 and 8 miles per hour, respectively, with the option of local authorities to extend these limits; but the bill further provides that the speed must not exceed 8 miles per hour in passing (or overtaking) persons driving horses or other domestic animals, and persons walking upon the highway; in crossing intersecting highways or while within a distance of one-half mile of a post office; 10 miles per hour in passing a building of public worship on a Sabbath or a public school during school hours, and 4 miles an hour in crossing a dam or causeway the traveled portions of which are less than 20 feet wide.

It is obvious that if this bill should become a law it would have the effect of practically reducing the speed limit of automobiles in the country to 8 miles an hour, except in sparsely settled districts,

juire the operator to be ever on the : for post offices, schoolhouses, etc. rtion of the bill requiring automo- o slow down to 8 miles an hour pproaching a person driving horses er domestic animals is among the bjectionable, and is entirely unwar- If the animal in question shows is of fright, there is no reason why omobile should not pass at any rate the limit of 20 miles per hour, and animal is frightened the driver has the right to demand the slow- wn of the vehicle by raising his

law now in force in New York s fairly satisfactory to automobilists e public, and if revised and rigidly d would safeguard the rights of the upon the highway.

bill just passed by the Senate is an e to automobilists, and the most en- efforts are needed to secure the or's veto of it in case it should pass sembly.

dar of Automobile Dates and Events.

o 14—Belgian National Circuit.
.—Motor Cycle Century Run.
—14.—Non-Stop Run of the Scottish o Club, Glasgow to London.
.—Start of Paris-Madrid Tourist Sec-
—21.—Commercial Vehicle Contest er the auspices of the Automobile of America.
—26.—Paris-Madrid Race.
— Massachusetts Automobile Club e Meet.
—20.—Paris Automobile Fetes.
—Gordon Bennett Cup Race.

Ideals in Automobile Construction—No. 2.

By J. S. V. Bickford.

re passing on to consider the pos- of improving the gasoline engine, perhaps be better to consider how steam car fulfills the ideal condi- id down in our first article.

were not for the attention demand- the boiler and its gauge glass the on of a steam automobile with any water or fire tube boilers would be p to our ideal conditions. All that erator has to do is to sit still, steer ntrol the speed, brake and reversing Further, if desired, the brake and levers may be combined so that the r of levers is within the three pro- in our first article. In spite of these however, it cannot be denied that ht steam runabout is not so popular as, and it cannot but be instructive mine why.

he first place the e ine is far too of a toy. When f an a omobile was designed with a small steam engine the fact no doubt occurred to the designer that the engine would be running normally at about one-tenth full load. He probably also knew or soon found out that the friction of an engine is not much higher at full load than at half load or no load at all, and he argued from these two facts that everything which he could think of to reduce internal friction of the engine must be introduced into the design. This leads to ball bearings, which are a source of constant trouble, and in the writer's opinion are by no means suited to the duty they have to perform. If ball bearings could be fitted under the slide valve something might be gained, but as that is obviously impossible I believe that the best course will be found to be to leave them out all together.

I am not speaking as an arm chair critic in the matter of steam cars, as I have designed and built two, the first of which was of the flash boiler type and the second of the Belleville water tube constant pressure type. This latter has given great satisfaction except for one or two points of structural design. The engines were single acting, lift valve machines, supplied by a Belleville boiler, made of ¾ inch steam pipe. This engine was carefully tested before going onto the car, and was found to have an efficiency of about 65 per cent. at 2 brake horse power and a higher efficiency at higher powers. I am a little doubtful if any ball bearing, double acting engine beats this in practice. All the bearings were lined with white metal and arranged to swivel to allow for bending of the crank shaft. The working parts of course ran in oil. The only advantage of ball bearings is, of course, to reduce friction, and this advantage is only worth having at low powers. It does not seem to have occurred to anyone that exactly the same result could be obtained by working a smaller engine at a higher maximum pressure. Thus, suppose, for the sake of argument, that the friction of this type of engine is in proportion to its cylinder sizes, which will be something like the truth probably, then all one has to do is to reduce the cylinder capacities by about one-half and double the steam pressure in order to have the same power engine with a lower friction for low powers. Of course, tricks of this sort can only be indulged in with a water tube boiler of good design.

There is another point which does not please me in the design of the steam car engine: it is double acting. Now no matter how well made a double acting engine is, it can never compete in durability with a single acting engine where both are equally neglected. As a rule the automobile engine is very much neglected, and I believe that this always will be the case. It is the same cry with steam launches. As a general rule they are badly looked after. It would therefore seem that one of the points the designer of the automobile of the future must bear in mind is that the engine must work when badly neglected. This condition is very well fulfilled by a single acting engine. With a reasonable amount of lead or compression, no matter how slack the brasses get there is no knock, and in consequence the engine will run for years without attention. The Willans electric light engine is single acting, and the writer once heard of a leading electrical engineer who, on being asked what a Willans engine was like inside, said: "I really don't know. I know there are three holes in the case of it, one for steam, one for exhaust and one for oil, and as long as I look after these the machine runs." That is the way the ideal automobile engine should run, and the condition is fairly fulfilled by a three cylinder single acting engine, with tappet valves. I pause here to say that exhaust through the side of the cylinders is a snare and delusion. Every maker of single acting engines has tried it at some time, and every one of them has abandoned it. The exhaust must be as carefully provided for as the steam.

Another thing in engine design to be avoided is the brotherhood type with three connecting rods on one crank, with the cylinders arranged radially. Unless every ounce of weight is to be saved this is useless and objectionable. It is true that in such an engine the connecting rods are always in compression, but a moment's thought will show that the crank shaft bearings are being thrust every way so that slackness here at once causes knock. Messrs. Simpson and Bibby once used this type of engine, but abandoned it, and several other people have done the same. The best engine of the sort has three cylinders parallel in line with three cranks 120 degrees apart.

Then again I have another quarrel with the present automobile engine and its makers. Many of them seem to think that split pins cost $5 each by the sparing use they make of them. I may say, however, that they are cheapness itself, and there is not a joint or nut on an automobile which should be without a split pin. In my present car, which has run perhaps from 500 to 1,000 miles, we have had as yet only one mishap on the road necessitating a stop and this was due to a small piece of the valve gear coming off. This was I believe absolutely the only piece on the car not split pinned, and had the pin not been omitted here the accident could not have happened. Let any of your readers who doubt the advantage of split pins go and look at a railroad locomotive. He will, at any rate in England, find every single joint on the machine split pinned. Think what would happen if the big end brasses of an express engine came off at 60 miles per hour!

Then there is another aid to motor building which is not used as it should be: The spring washer. The Thackery spring washer consists of two turns of a spiral spring made of flat section steel coil on

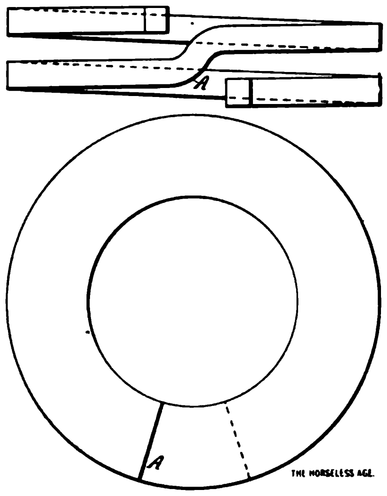


FIG. 1.—THACKERY SPRING WASHER.

edge with the middle part joggled (A in Fig. 1) so that when compressed under a nut it lies flat. The sketch gives some idea of what it is. A nut to which one of these washers is applied simply cannot work loose. It is far better than a back nut.

Our ideal car should therefore have a single acting engine with tappet (or lifting) valves. Its crank chamber should be enclosed, and its moving parts should run in oil. No cylinder lubrication is then found necessary, as the splash of the cranks does all that is required. No amount of superheat will damage the engine, which is an advantage.

Let us now consider the boiler and the conditions which it must fulfill. Obviously the present pea blower museum does not fill the bill. In the first place the water has to be watched, and in the second, if the water fails the boiler is ruined. Neither of these conditions is admissible. It should not be necessary to watch the boiler feed. Either this must be controlled

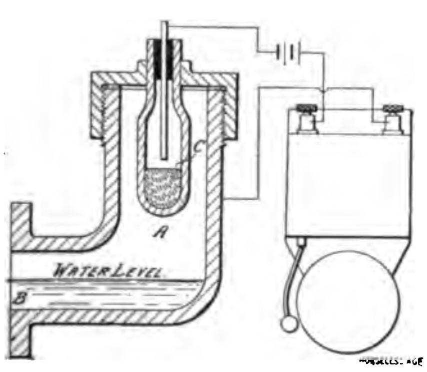


FIG. 2.—WOLFF'S LOW WATER ALARM.

automatically or a low water alarm must be provided, which shall be of such a nature as to attract the driver's attention if he is not on the lookout for it. I have already described the various boiler feed devices on the market (see recent number of THE HORSELESS AGE), many of which will be found to answer all right, but I am inclined to think that a suitable alarm will be found better than a wholly automatic device. In the first place it can be made more reliable and in the second it admits of a little hand regulation for hill climbing, etc. Such an alarm will be found on the market in the form of Wolff's low water alarm. This consists of a small chamber A (Fig. 2), connected with the boiler at the desired water level by the passage B. Into the top of the chamber is secured a small metal bottle of mercury C. When the water level is normal the chamber A is full of water, and this water is cold, but as soon as the water level uncovers the mouth of the connecting tube the water in A runs back into the boiler, and the chamber A is filled with steam. This warms up the mercury, which expands and makes an electrical connection, which rings a bell on the dashboard. When the chamber fills again and the water cools off the bell stops.

A modified steam trap which should open when steam gets to it (instead of, as usual, closing) would also do.

I know from experience that electric low water alarms can be worked successfully on a car, and the sense of freedom and security which such an alarm gives has to be experienced to be appreciated.

My ideal steam car will therefore be fitted with a low water alarm in preference to automatic regulation.

This brings us to the question of the boiler, which must be so designed as to be able to be made red hot, without damage in the event of the low water alarm failing for any reason. For though I believe a low water alarm may be made reliable enough to trust to where a failure only means an hour's stoppage, I do not consider it would do to trust the existence of the boiler to it. I hope later on to return to this matter.

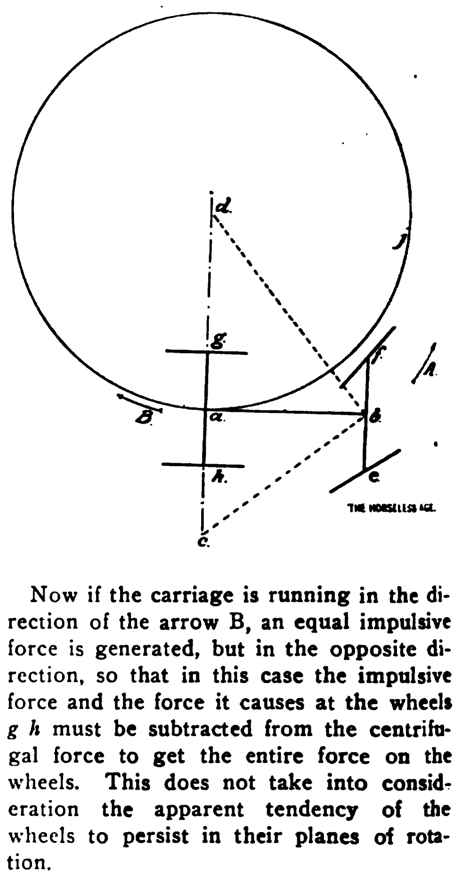
Front or Rear Wheel Steering.

By E. J. STODDARD.

When a carrige is turning it may always be considered as turning in the arc of a circle about a momentary centre, and we can study its motion as if it was to be continued for a complete revolution. Let d in the figure be the momentary centre about which a carriage is turning, the centre line of the carriage being indicated by $a\,b$, the driving wheels by $g\,h$, and the steering wheels by $e\,f$. The vehicle has a sort of cosmical motion in that it is moving as a whole about the point d and is revolving about a point a in its own body. Every time it passes around d it revolves once around a, and the angular velocity is the same about both points. The motion around d gives rise to centrifugal force, which in pounds is equal to the weight of the carriage multiplied by the square of the linear velocity in feet per second, and divided by 32.2 times the radius in feet, $= \frac{W\,V^2}{32.2\,R}$. The direction of this force is radially away from the centre d. To cause the rotation about a requires an impulsive torque or moment, which in statical foot pounds is equal to the moment of inertia, L, about the point a multiplied by the angular velocity and divided by 32.2 times t, the time in seconds in which such angular velocity is created, i. e., $\frac{I\,w}{32.2\,t}$. This is true if the impulsive force is constant; if it is variable we must take its instantaneous value thus,

$$\frac{I\,w}{32.2\,d\,t}.$$

If the vehicle is going in the direction of the arrow A, the front wheels are the steering wheels, and the impulsive force upon these wheels is in the same direction as the force resisting the centrifugal force. To get the entire force upon these wheels the impulsive force must, therefore, be added to the centrifugal force. This force also gives rise to a force at the rear wheels, which must be added to the centrifugal force to get the entire force upon those wheels.



Now if the carriage is running in the direction of the arrow B, an equal impulsive force is generated, but in the opposite direction, so that in this case the impulsive force and the force it causes at the wheels $g\,h$ must be subtracted from the centrifugal force to get the entire force on the wheels. This does not take into consideration the apparent tendency of the wheels to persist in their planes of rotation.

EXPRESSIONS FOR THE VARIOUS FORCES.

In order that all the wheels shall be running in their planes of rotation, the centre line $a\,b$ must be tangent to the circle in which a is turning, and the wheels e and f must be tangent to circles about d. The point b must also be turning in a circle about d. Draw the radius $d\,b$, and perpendicular to this at b draw the line $b\,c$ to meet $d\,a$ produced. Then the triangle $a\,b\,c$ is similar to the triangle $a\,b\,d$, because their sides are perpendicular. Therefore $a\,b : a\,c :: a\,d : a\,b$, or calling $a\,d = R$,

B (the base line) and angle $a\,b\,c$ we have

$$B : B \tan A :: R : B$$
$$R\,B \tan A = B^2$$
$$R = \frac{B}{\tan A}.$$

somewhat similar way it may be that $b\,d = R\,I = \frac{B}{\sin A}$. The an- may be taken as one-half the sum two angles the wheels $e\,f$ make with ntre line $a\,b$. Substituting this last sion for R in the equation for the ugal force gives

$$\text{Centrifugal force} = \frac{W\,V^2 \sin A}{B}.$$

angular velocity about d, which is ne as that about a, is equal to

$$\frac{V}{R} = \frac{V}{\frac{B}{\sin A}} = \frac{V \sin A}{B}.$$

ne impulsive torque, or moment, is nt while it is accelerating the angu- ocity about a from zero to $\frac{V \sin A}{B}$ ne is

$$\frac{I \frac{V \sin A}{B}}{32.2\,t} = \frac{I\,V \sin A}{32.2\,t\,B}.$$

ny case while the constant force is ating the angular velocity from one w_1 to w_2 its value is

$$\frac{I\,(w_2 - w_1)}{t},$$

erally

$$\frac{d\,w}{d\,t}.$$

force on the wheels $g\,h$, due to the ive force, may be expressed as fol- Let r = the distance of the centre of om a. Its linear velocity is then

$$\frac{r\,v \sin A}{B}$$

acceleration

$$\frac{r\,v \sin A}{B\,t},$$

nsequently the force accelerating it

$$\frac{W\,r\,v \sin A}{32.2\,B\,t} \text{ pounds,}$$

ng the weight of the vehicle in . The force on the rear wheels is re

$$\frac{W\,r\,v \sin A}{32.2\,B\,t} = \frac{I\,V \sin A}{32.2\,t\,B^2}.$$

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first meeting of the incorporators of ck Diamond Automobile Company ld at Geneva, N. Y., on April 11, ectors and officers were elected as : President, D. W. Hallenbeck, ; vice president and manager, Turner, Brooklyn, and temporary y and treasurer, E. I. Cook, Ge- directors, John F. Hylan, Brook- R. Rogers, Seneca Falls; William the inventor, Brooklyn, and G. A. , Brooklyn.

BEGINNERS PAGE.

General Arrangement of Electric Carriages.

The following three arrangements of motors are now current in American electric vehicle practice. A single motor is supported by the rear axle casing at the middle thereof and drives the live axle through gearing; a single motor is suspended from the body and drives the live rear axle through a chain; two motors are used, each of which is geared by spur gearing to one of the rear wheels, and is supported on the rear axle and on one of the reach bars. Electric motors generally run at a fairly high rotative speed, and to secure noiselessness of the gearing raw hide pinions or "fishbone" gearing is often used. When a single motor is used, which is supported by the rear axle casing, the gearing is entirely enclosed, but when the motors are geared to the wheels the gears are usually exposed.

In a runabout the battery is always arranged in the rear part of the body. In a surrey the battery is generally divided up into two halves, one-half being placed in each of the seats. In tonneau designs which have recently been brought out one-half of the battery is placed under the front seat and one-half in a compartment at the front of the car. Sometimes the battery in the larger, four passenger vehicles is "underslung"—that is, disposed in a box below the floor of the body. The battery space must always be well ventilated.

The controller and reversing switch are always located in the driver's seat, where they are very accessible by taking out the seat board and the front board. The connections between the controller, the motor and the battery are made by means of flexible, rubber insulated stranded cable.

In the main circuit of the wiring a plug switch is inserted, the plug of which can be removed and carried in the pocket when the vehicle is left standing on the curb, and it is then impossible for outsiders to start the car. The electric carriage usually is provided with electric side lights, which receive their current from the storage battery of the car, and with an electric alarm bell. The lights can be turned on and off by means of a snap switch, and the bell circuit is closed by means of a foot button. The equipment further includes as a rule a combined volt and ampere meter attached to the footboard of the car. The voltmeter enables the driver to tell the state of charge of his battery. When the battery is fully charged and is furnishing no current it will show about 2.3 volts per cell, and when discharged to the point beyond which it is not advisable to go it will show about .8 volts per cell. If the discharge is continued further the E. M. F. will drop very rapidly. The voltmeter is not a very sensitive charge indicator, and gives reliable indications only of full charge and of practical exhaustion. The ammeter shows the rate at which power is used on the road and the rate of charging when the battery is reloaded.

Electric vehicles are usually provided with charging terminals and connectors, which are so constructed that no wrong charging connections can be made. Some manufacturers make the two terminals concentric with each other, and others make them of different size, and so that the plug part of the connector has to pass through a hole in an insulating protector. The larger plug cannot be gotten through the smaller hole and in contact with the metal part of that connector, and it is therefore impossible to make the charging circuit through the battery the wrong way.

CHARGING FACILITIES.

The purchaser of an electric carriage must look for facilities for recharging his battery. If he has a direct current lighting circuit on his premises he needs only a rheostat or resistance box, which is usually furnished by the manufacturers of the car. However, if the voltage of the circuit is very much higher than that of the battery it will be more economical to install a motor generator for reducing the voltage than to cut it down by resistance. For instance, if the line voltage is 220 and the battery voltage only 60, nearly 70 per cent. of the energy drawn from the circuit would be wasted in the resistance and only 30 per cent. stored in the battery, while with a motor generator the loss need not be over 20 per cent.

If the line current is alternating the only means of charging a storage battery from it is to transform it into a direct current by means of a motor generator set, consisting of an alternating motor, which drives a direct current generator. When there is no electric current on the premises a gas engine generating set can be installed. Special gas engine generating sets, which are automatic in every particular, have been developed for this purpose. Should the gas engine stop for any reason the battery is automatically disconnected from the dynamo, and is therefore not discharged. When the battery is fully charged it is automatically disconnected, and the engine automatically shut down. Such a charging plant needs therefore practically no attention when in operation. Those who keep their carriages at a storage station have them charged at these stations, of course.

A conference of the clubs affiliated with the A. C. G. B. I. has been held, at which the Liverpool Self Propelled Traffic Association and the Scottish, Manchester and Yorkshire clubs expressed opposition to affiliation with the Motor Union.

LESSONS OF THE ∴ ROAD ∴

Interesting Trip from Pasadena to Santa Barbara and Back.

By Henry Chisholm.

When I first planned to come out to California this winter I could find out from no one the exact state of the roads for automobiling, but I brought my machine as an experiment. I have run about 1,500 miles in this machine around Pasadena and Los Angeles, Pomona and Santa Barbara, and must say that the roads are much better than my best expectations. The condition of the roads in general is very much better than that of the roads in New England, and the village councils have not gotten the idea into their heads that automobiles have no right to travel. All of the inhabitants along the country roads will do anything to assist anyone in any way imaginable. After touring around Southern California for a while I decided to go to Santa Barbara, a distance of about 130 miles from Pasadena. It is generally understood here that the roads between Los Angeles and Santa Barbara are unfit for automobile touring, but four automobilists from Pasadena made up their minds to take the trip and see what the roads are like. We started from Pasadena, at the corner of Orange Grove and Colorado streets, at 8:15 a. m.

The party consisted of my sister, Miss Josephine Chisholm, Miss Blackwell, of St. Louis, and Mr. Parmlee Herrick, son of Myron T. Herrick, of Ohio. This trip of 350 miles was made in a standard gasoline touring car, and the journey was accomplished without the slightest accident or damage to the machine.

We took the well known road over the Arroyo and past the famous Eagle Rock to Glendale. After getting over the hills the excellent condition of the roads began *to make us think* that we were going to make a record trip to Santa Barbara. The morning was bright and clear at the start, but as we got up the valley toward Fernando, a wind coming from the northwest began to make us think that old Boreas had let loose all of his wind bags.

The route to San Fernando and the tunnel of the Southern Pacific beyond was a little bit up grade, and fast time was impossible. We arrived at the tunnel at 10:05 a. m. The ladies in the party seemed to get very cold on the trip to the tunnel. The wind was blowing at the rate of 30 miles per hour while we were going about 20 and it was dead against us. Each of us had two overcoats, and the ladies two or three veils apiece and the gentlemen wore goggles, so we were well protected. The distance to the tunnel is about 25 miles.

After we got to the tunnel we encountered the steepest grade any of us ever attempted. It was not so bad up to 200 yards of the top of the mountain, but from there on it looked almost impassable. The incline at this point appeared to be about 45 degrees Two of the company got out as soon as we struck the steepest place, and shortly after the third one got out. For about 200 feet the only way the machine would go ahead was to back it down sideways across the road, then let the engine go at full speed and suddenly throw in the last clutch, and at each of these attempts the machine would go forward about 20 or 30 feet.

The descent was very steep, but not as bad as the ascent. We met a party of colonists camping at the bottom of the hill, having given up the idea of going any further against the gale that was blowing, but that never daunted this automobile party.

We then followed on the road to Newhall, arriving there at 10:30 a. m. The road from there to Saugus was very good. Then we went on to Piru, and on this part of the road we went through several fords which had about 2 feet of water in them. For about 2 miles we went through what I think was the meanest part of the trip. It was along the lowlands of the river, and several times we had to go through alkali swamps, the bushes and undergrowth along the road as they tapped the mud guards making it seem as if we had a lot of tin cans tied on behind us. This alkali swamp did not delay us, although we thought at one time we would be compelled to wrap the rear tires with rope to prevent them from slipping.

At Piru we stopped for fifteen minutes to eat a little lunch which we had taken along, and also to inquire about the road. We then went on to Fillmore and found the roads excellent. We forded several streams with about 2 feet of water with no difficulty. By this time the wind had gone down and it did not bother us any more.

The road then took us to Santa Paula, which was reached at 2 p. m. The roads were excellent. From Santa Paula to Ventura the roads were fair, and we averaged about 17 miles an hour, arriving at Ventura at 3 o'clock. Here we stopped for about fifteen minutes to stretch and inquire about the roads. Up to this point of our trip we had made no stops at all on account of the machine, everything running smoothly and keeping cool.

The Start from Pasadena.

Towing the Machine Out of the Water.

Here we found that there were two roads to take us to Santa Barbara, one by the beach and the other by the Casitas Pass. None of the men questioned concerning the roads seemed to know what an automobile required. We took the beach road.

STUCK IN MIDSTREAM.

Just after leaving Ventura we forded several streams, the deepest one being the Ventura River, and there the machine stopped in the middle of the stream, the water being over 3 feet deep, but there was no current.

A number of citizens of Ventura had followed us up to this point, with the expectation of seeing us stuck. A small express wagon drove up alongside and the rest of the party climbed into it and were taken across to dry land. The wagon was backed up, a rope fastened on the front axle, and the machine was nearly drawn out of the river when the horse started to balk and would go no further. We had to

; wagon from the machine, and ıgon with two steady horses ıg at this moment, was hitched hine and pulled us onto dry e were delayed here about an e water splashed over the id it had also worked into the hese parts had to be dried and nt on. We went along fairly and some places where the ry deep straw had been strewn id and made it not at all bad, e had to go down onto the g to the fact that the Southern road had taken the old coun- d left practically nothing but or driving.

A SANDY SLOUGH.

nto the beach and went along bout 8 miles, the tide being we were compelled to go up rd beach and were stuck fast , dry sand above where the n. The rear wheels sank into arly to the axles and the ma- alled.

farmer on a side hill plowing, sed his team into service, get- right, and went on 3 or 4 vere then compelled to go out ach again, and here we stuck n the deep sand. It was then , and as there was no ranch eing within 5 miles on either we did not know what to do. ng quite cold, and we decided blankets, coats and satchels a short distance and sit down ter of some sand dunes and

going to wait for the train that Santa Barbara at about 11 en all at once we heard a saw the headlight of an engine n Santa Barbara.

ken the lanterns from the ma- ad lit one on purpose to flag it came along. We swung the t across the track, and, luckily engineer thought there was a dge or mishap ahead and engine to a stop. The train to be the limited and we got The conductor was furious, as he saw there were ladies in said it was all right, and all ngers thought it was a great went back to Ventura on the g the machine on the beach et from high tide. We passed Ventura and were very com- vided for.

morning we got a spring drove up to where the machine ft, and thought by the assist- team we could get over the istance, about a mile of deep would then strike fine roads Santa Barbara. Just south of Rincon goes into the ocean point of rocks and boulders of the beach, 2 or 3 feet high.

We decided it was impossible to go over this and turned back, and with the assistance of the team got the machine out of the sand where it had been stuck over night, and went back to Ventura with no further trouble, the team helping us where we had been stuck before.

We arrived at Ventura at 4:30 p. m. and filled the machine with gasoline and started for Santa Barbara, via Casitas Pass, at 5 p. m. The road up to the beginning of the pass was excellent, but here we forded three little creeks, and once we got stuck the water splashed up and short circuited the tremblers. We dried this off, and then, climbing on the reaches, started the machine and began the climb.

The sun was just setting and the views and coloring on all sides were exquisite. We had gone about a mile or two on this pass when we started to go down hill again, and all thoughts of hill climbing being

Headed for Home.

ended were amiss. Passing several ranches we soon found out the pass was about 10 miles longer. Then we began the real climb, the summit being about 2,600 feet above sea level. The beginning of the pass is probably about 400 feet above the sea level, and in 5 miles we had climbed 2,200 feet—an average grade of 8.3 per cent.

It was dark when we reached the top of the pass and the lamps and searchlight were lit. The descent was exciting and some would probably think dangerous. We had gone down hill for about half an hour when the road began to ascend once more. We all began to get quite discouraged and tired of hill climbing, when all of a sudden we came around a sharp turn and the lights of Santa Barbara came into view. Here we all shouted, and had we not seen the lights at this point another half hour of hill climbing would not have been to our liking. During all of the climb the machine never faltered once. The water which cools the cylinder had only evaporated about a pint on the whole trip, so this proved we could climb hills all day long and not injure the machine in the least.

We finally got to the bottom of the pass, and from there on to Santa Barbara the roads are ideal. It was pitch dark, but with the aid of the searchlight we could get along at about 25 miles per hour. We arrived at Santa Barbara at 8:15, the machine and everything being in excellent condition and all of the party in high spirits. Our friends were pleased to see us, as they had been telephoning all over the country to find out where we had been for the last two days. The trip up from Pasadena would have required ten hours had we taken the right road at Ventura.

The next morning we went over the machine and found everything in good shape. The only thing that was done to the machine was to clean out the gear case, which had been filled with water in the deep stream when we were stuck; but this had not hurt the gears in the least.

The trip back to Pasadena was not so exciting, although we enjoyed every minute of it. We left Santa Barbara at 9:05 a. m. and arrived at Ventura, having gone up the Casitas Pass, at 12:35. From there we went to Santa Paula, a distance of 15 miles, arriving at 1:25. We rested at Santa Paula about twenty minutes and then went on through Fillmore, Sespe and several other small villages, arriving at Piru at 2:50 p. m. At Piru we rested for ten minutes and then went on to Saugus and Newhall, where we arrived at 4:40. Then we went over the cut and down the other side with no mishap. If we should ever go down this side of the hill again we would not fail to tie a good sized log or something of this sort on behind the machine, because the hill is so steep it is impossible to keep from going too fast over the exceedingly rough and steep descent.

We left the tunnel at 5:25 and from there to Fernando the roads were fine, a little bit down hill, but better than many boulevards. We arrived at Fernando, a distance of about 8 miles, at 5:45. From there on to Burbank the roads are just as good, but as it was getting dark we did not

dare to go any faster. We have made this 11 mile run since in twenty-seven minutes. We arrived at Burbank at 6:15, and to be on the safe side filled up with some more gasoline and left at 6:30, arriving at the top of Scoville's Hill and Grand avenue at 7:15. The total time from Santa Barbara was ten hours ten minutes, from which should be deducted one hour and ten minutes for various stops along the road. These stops or losses of time consisted of fifteen minutes in the morning, when we lost our way on the pass; a stop of fifteen minutes at Santa Paula to telegraph and rest, and about every hour or two we stopped for four or five minutes to feel the different bearings to see that they were not heating; then the rest at Newhall of ten minutes, and fifteen minutes at Burbank, when we filled up with gasoline and lit the lamps; so that the actual running time from Santa Barbara to Pasadena was less than nine hours.

Should we attempt the trip again we could lower this time somewhat; but, considering the hills, which are impossible to climb at more than 4 or 5 miles an hour, we did well enough. The sights and views could not be enjoyed at all if we went much faster.

Our trip to Santa Barbara was the most enjoyable time I ever spent. The troubles that we got into and the experience of flagging the train and almost camping out at night were easily worth a trip to California from the East and back.

THE TOP OF THE MOUNTAIN.

STUCK IN MIDSTREAM.

W. C. Metzger, Detroit, Mich., is adding *four floors* to his garage.

Oil Separation on Condensing Steam Cars.

It has been found by C. Bach, who has investigated the subject of oil separators, that the quality of oil used has a great effect on the amount of purification obtained. Two different grades of oil used in the cylinder of an engine showed the following results in a separator placed in the exhaust pipe: Oil No. 1—Amount of oil in the exhaust before purification, 0.0105 per cent.; after passing through separator, 0.0025 per cent. Oil 2—Before purification, 0.0290 per cent. oil; after purification, 0.0005 per cent. oil. The respective degrees of purification were 76.2 per cent. and 98.3 per cent. In the former case the condensation water was noticeably milky, while in the latter case it was quite clear. On analysis the two grades of oil showed a great difference in the percentage of saponifiable fats which they contained. Thus oil 1 contained 2.44 per cent., oil 2 only 0.01 per cent. saponifiable fat; in the case of oil 1 this fat was quite similar to tallow. Mr. Bach concludes that the great amount of this tallowlike fat in oil 1 was responsible for the poor degree of separation produced by the separator; the action, he thinks, is due partly to the emulsion forming ability of this fat, and partly to its decomposition by the steam and the subsequent formation of calcium soaps with the lime contained in the water.

Schollenberger Brothers, Wichita, Kan., have equipped a building 50x60 feet for an automobile repair shop.

Alcohol from Acetylene.

As a result of experiments made some years ago by M. Berthelot in the chemical analysis of alcohol, efforts have been made to perfect and simplify the proceedings that he had indicated, and it now appears that chemical alcohol can be made from carbide calcium and its product acetylene at from 20 to 25 francs per hectolitre ($3.86 to $4.82 per 26.417 gallons), and even for 12 francs ($2.32), the alcohol to be of 100°.

A molecule of alcohol is composed of two atoms of carbon, six of hydrogen and one of oxygen. Synthetical alcohol is obtained by uniting these atoms according.

For a long time it has been known that by the direct combination of carbon and hydrogen in the electric arc, acetylene can be obtained. Sufficient hydrogen must be added to the acetylene to produce ethylene, a constituent of illuminating gas. In combining water with the ethylene, alcohol is obtained. Thus, alcohol has already been produced in France without the employment of vegetable matter.

In contact with water 100 kilograms (220.46 pounds) of carbide of calcium give about 30 cubic metres (1,059 cubic feet) of acetylene, weighing nearly 35 kilograms (77.16 pounds). Upon hydrogenation this produces 37 kilograms (81.57 pounds) of ethylene, which after hydration forms 22.4 gallons of alcohol at 98°. Thus, to have 100 litres (105 quarts) of alcohol it is necessary to employ at the beginning 117 kilograms (258 pounds) of the carbide, the net cost of production of which is, in France, 23 francs ($4.44).

:HICLES AND PARTS.

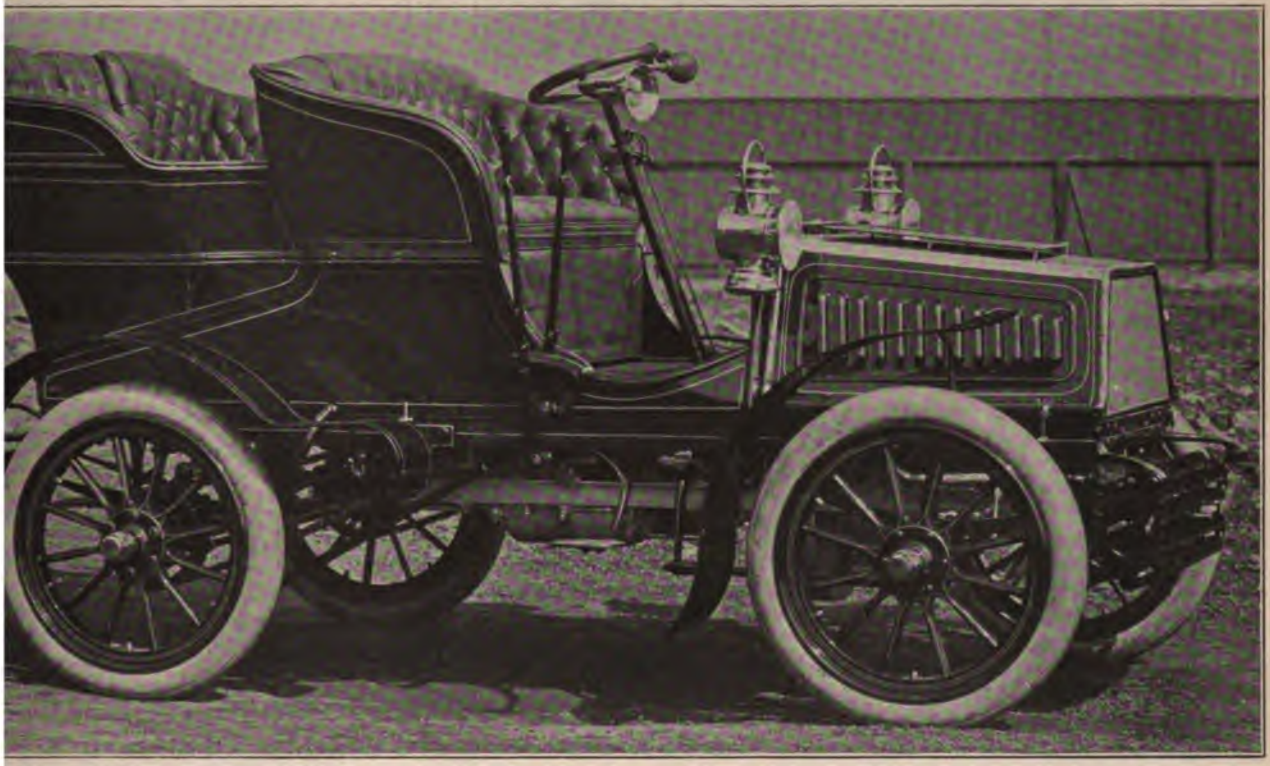
'e Horse Power Toledo oline Touring Car.

nal three cylinder 18 horse ne touring car of the Inter- or Car Company has this sea- owed by a two cylinder and a car of similar design, and the v manufactures two, three and machines, rated at 12, 18 and rer respectively The cylinder f the three engines are alike, rent cars are designed on sim- though the four cylinder car vith a number of fittings and that are not found in the two . The photo and drawings :r to the 12 horse power two

-base of this vehicle is 76 e tread standard. The wheels illery wood pattern, 30 inches provided with twelve spokes tted with 3½ inch G & J in the case of the vehicle his data was taken, though it the make of tires is optional aser. Both front and rear ball bearings. The rear axle rging of square section, 2x2 front axle is a round tube 2 tside diameter, and is formed n the centre. The body frame on semi-elliptic springs in the rear, and the car is said onally easy riding. The front 4 inches in length, 1¾ inches in width, and have five leaves; the rear springs are 36 inches in length, 2 inches in width, and also have five leaves. Panhard type of axle ends and steering knuckles are used. The running gear frame is of composite construction, consisting of beams of second growth ash, lined with steel plate 3-16 inch thick. The motor and change gear are supported upon a false frame of angle iron. The main frame is slightly narrowed down in front, as shown by the plan view.

THE ENGINE.

The engine is a two cylinder vertical one of 4¼ inches cylinder bore and 5¼ inches stroke, and runs at 900 revolutions per minute, normal speed. The two cylinders are cast integral and are bolted down to an aluminum crank case, which is divided in a horizontal plane through the centre of the crank shaft bearing. The crank shaft is of the double throw type, insuring the best possible balance of reciprocating parts for this type of engine, and has three bearings. The central bearing is entirely independent of the lower half of the crank case, and the lower half of the casing can therefore be taken off, while the crank remains in position supported by the central bearing. Attention should be called to the method of adjusting the outside bearings by means of a set screw passing up through the support of the bearing from below. The cylinder heads are separate from the cylinders and are cast integral with the valve boxes. As the sectional views show, the water jacket not only surrounds the cylinders but also the cylinder heads and valve chamber. Exhaust and intake valves are both mechanically operated and are identical with each other. They are located side by side, and the valve spaces communicate with the compression space through the same passage. The openings over the valves are closed by plugs. The valve stem guides are fitted into the valve chamber wall without threading. The cam shaft is driven from the crank shaft by spur gears of bronze located outside the casing at the front end of the engine. The cams are enclosed in a special housing bolted to the crank casing, and operate on the valve push rods through the intermediary of cam rollers at the lower ends of these rods. The spark plugs are fitted centrally into the cylinder head. The upper half of the crank case is fitted with arms, by which the engine is supported on the angle iron false frame. The piston is of unusual length and is fitted with four packing rings, two of which are placed in the same groove. The connecting rod is a drop forging and provided with a connecting rod end of bronze. The flywheel of the engine is bolted to a flange on the crank shaft outside the bearing, as is customary where it serves at the same time as a friction clutch member. It is 16½ inches in diameter, and is turned with an internal taper surface to receive the leather faced friction cone of the transmission clutch. The two cylinders are lubricated by means of oil cups and the bearings in the crank chamber are lubricated by splash. The weight of the engine, complete with flywheel, is 233 pounds.



Twelve Horse Power Gasoline Touring Car.

IGNITION.

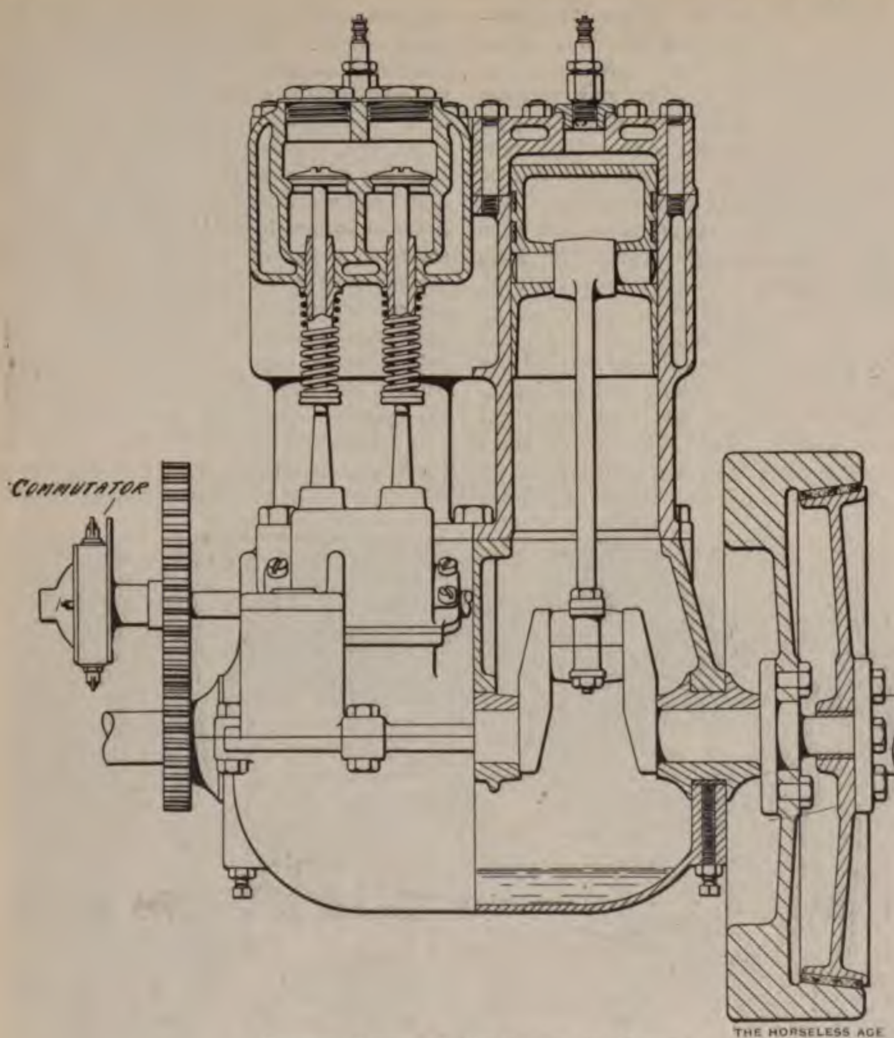
Jump spark ignition is employed, the spark plugs, as already stated, being fitted into the head of the cylinder. The ignition

tor of sixteen tubes is placed belo water tank, and the gear pump, whic culates the cooling water, is placed di behind the tank, so that the water co tions are very short. The gear pu driven by means of a chain from th gine crank shaft, at the same speed a engine. The bonnet is hinged to the board, and when raised gives access parts of the engine and its accessorie screen of wire gauze in the front c bonnet hides the water tank from vie

THE TRANSMISSION.

The friction clutch is of the usual c type and is pressed into engageme means of a coiled spring concealed sleeve upon the clutch shaft. All end is self contained within the clutch. change gear is of the sliding gear typ gives three forward speeds and on verse. It is operated by a single leve is completely enclosed in a dustproo minum case. The three speeds forwa 6, 14 and 30 miles per hour respect The bevel gears transmitting power the change gear shaft to the differ gear shaft give a reduction in the ra 5 : 6. The differential gear is enclosed in the change gear casing. All the ings of the change gear casing are with bronze. The change gear is su with lubricant by means of a grease on the dashboard.

As will be observed from the plan

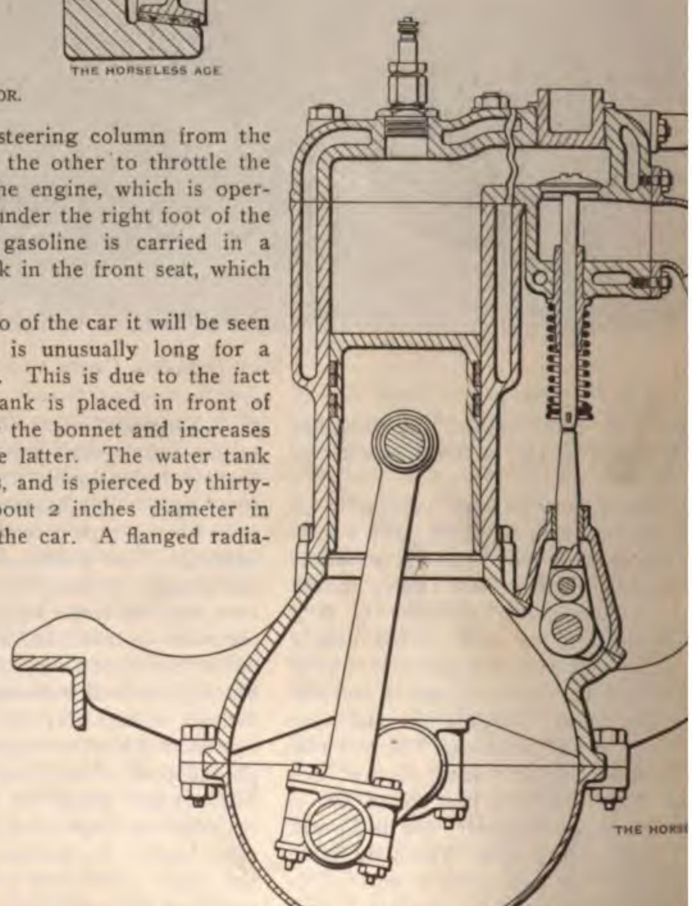


SECTION THROUGH CYLINDERS OF MOTOR.

current is furnished by a dry battery of six cells, disposed in a compartment in the front seat. The commutator is located at the front end of the cam shaft, and is fitted with an aluminum cover, which can be very readily snapped off for examination. Two coils, with magnetic buzzers, are employed, which are placed in a hardwood box attached to the dashboard. The time of spark is varied in the usual manner, by means of a small handle on the steering column, which rocks the commutator around its surport.

The carburetor is of the constant level, float feed type, and is located close to the cylinder. The air intake is placed directly below the exhaust pipe, to insure the air drawing in being warmed, and the carburetor has only a single pipe connection to the engine, the spaces below the intake valves of the two cylinders being in communication with each other. An air throttle is placed in the air pipe, this throttle being operated by means of a handle at the front of the car. In starting the engine by hand this handle is drawn out, which practically closes the air throttle and thereby insures a rich mixture getting into the cylinder. The carburetor proper has two adjustments, one to vary the proportion of air and gas, which is operated by a small hand lever on the opposite side of the steering column from the spark lever, and the other to throttle the flow of gas to the engine, which is operated by a pedal under the right foot of the operator. The gasoline is carried in a sheet copper tank in the front seat, which holds 10 gallons.

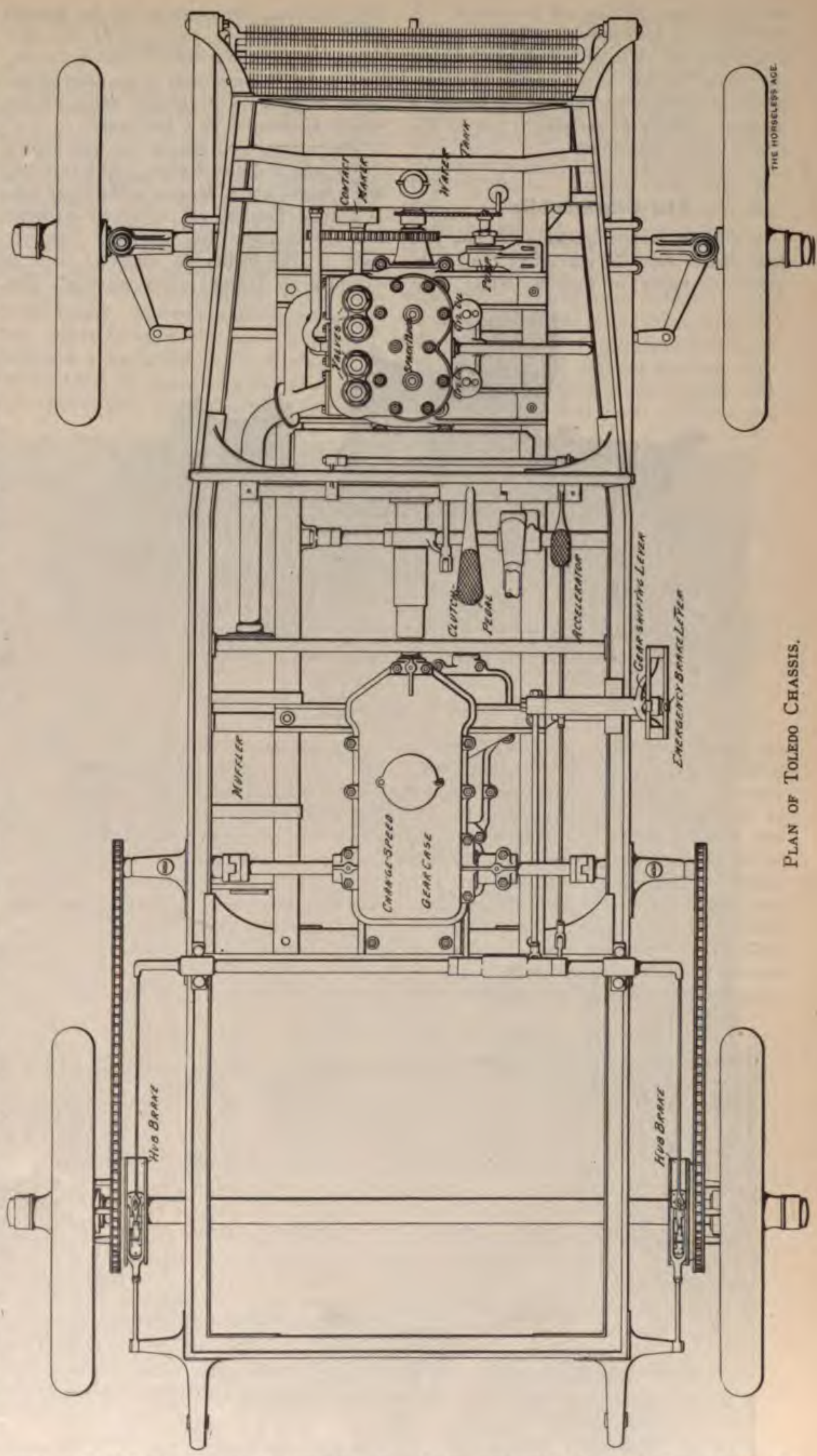
From the photo of the car it will be seen that the bonnet is unusually long for a two cylinder car. This is due to the fact that the water tank is placed in front of the engine under the bonnet and increases the length of the latter. The water tank holds 5½ gallons, and is pierced by thirty-four tubes of about 2 inches diameter in the direction of the car. A flanged radia-



SECTION THROUGH CYLINDERS AND VALVE CHAMBER OF MOTOR.

vehicle the countershaft is fitted with a sort of universal joint on both sides of the gear casing, and both ends of the countershaft are supported in very long and substantial bearings, which are lined with babbitt metal. The transmission to the rear wheels is by separate chains, Diamond chains of 1¼ inch pitch and with five-eighths inch rollers being used. The sprockets have twelve and twenty-three teeth respectively, and when the car is driven on the high gear the ratio of reduction from the engine to the drive wheels is 3⅓ : 1. The rear wheels are fitted with drums for band brakes, which are 8½ inches in diameter and have 1¾ inches brake surface. The brakes are of the double acting band type and are operated by a hand lever on the right hand side of the seat through the well known stranded cable equalizing device. The car is also fitted with a sprag. Steering is by means of a 14 inch hand wheel of laminated wood through an irreversible worm and sector mechanism. The joints of the steering mechanism are of the adjustable ball type.

The car has a roomy tonneau, which will seat three if required, and is fitted with large fenders, steps and lamps. The finish is of the usual high grade of the International Motor Car Company. The weight of the car complete is 1,800 pounds.



PLAN OF TOLEDO CHASSIS.

The Ide-Sprung-Huber Gasoline Delivery Wagon.

At the recent Detroit show was exhibited a motor delivery wagon belonging to a local newspaper which had been changed from electric to gasoline propulsion. The electric motors and battery had been taken out and a four cylinder gasoline motor and change gear been substituted by the Ide-Sprung-Huber Company, of Detroit. Before the change was made the vehicle unloaded weighed 5,700 pounds, and after the change 3,800 pounds. The following description of the new equipment is furnished:

This engine is capable of developing from 15 to 21 horse power, having a bore of 3¾ inches, and a stroke of 4½ inches, and makes from 75 to 1,500 revolutions per minute. The compression is high. The flywheel, which, by the way, only weighs 40 pounds, is used as the friction clutch. The intake and exhaust valves are arranged on opposite sides of the cylinders, and are both mechanically operated. The ignition is by jump spark with current furnished by a battery of ten dry cells. The vibrator with a quadruple cam is mounted on and operated by the intake valve cam shaft, and the secondary current commutator is mounted on the exhaust valve cam shaft. The vibrator and commutator are connected by a link, so that when it is desired to vary the period of ignition they are moved together by a single operation.

When the machine is standing still and the engine is going, all gear wheels are standing still. In starting up, the low speed gear is thrown in first. While running on this speed, all other gears are running in mesh, although performing no work. When the next higher speed is thrown in, the slow speed gears continue to run, but cease to do any work. This is also true of the back-up gears. When running at high speed, the engine is connected by a straight shaft to the driving countershaft, the latter being connected to the rear wheels by means of chains. While the controlling lever is in the high speed notch all gears are running, but on account of their being bronze and cast steel there is little noise.

An emergency brake is convenient to the right hand of the operator, by which the machine can be brought to a sudden stop, at

the same time shutting off the power. A foot brake is also provided, which applies a powerful set of band brakes and releases the power at the same time. The Ide-Sprung Company had agreed to furnish a machine capable of carrying a ton at the rate of 15 miles an hour.

The Clarkmobile.

A medium weight gasoline car has just been placed upon the market by the Clarkmobile Company, of Lansing, Mich. This car weighs complete 1,100 pounds, and is propelled by a single cylinder, horizontal, four cycle engine of 5 inch bore, claimed to develop 6½ to 7 horse power. The engine has a crank shaft of forged iron, 1⅝ inches in diameter, provided with balance weights. The valve gears are cut with spur teeth and are encased and run in a bath of oil. The speed of the engine is controlled by a throttle which allows of varying the speed of the car from 5 to 30 miles an hour without changing the gear. The ignition is by jump spark, the current being furnished by two sets of dry batteries. A three way switch allows the circuit to be changed over from one to the other battery. The throttle valve of the engine is operated by a foot lever.

The transmission gear is the well known Upton sun and planet gear, giving two forward speeds and a reverse. The front axle is a solid forging, 1½ inches in diameter and provided with ball bearings. The rear axle is 1¼ inches in diameter, and is mounted on Timken roller bearings. The compensating gear is entirely enclosed and the casing is filled with lubricant. The rear axle is enclosed in a steel tube and is reinforced by truss rods. The transmission to the rear axle is by a Baldwin chain of 1 inch pitch and one-half inch width of roller. The road wheels are of the wood artillery type with hickory spokes and malleable iron hubs, and are shod with Dunlop detachable tires. The car is fitted with wheel steering, the Brown & Lipe enclosed worm steering device being used.

The Clarkmobile.

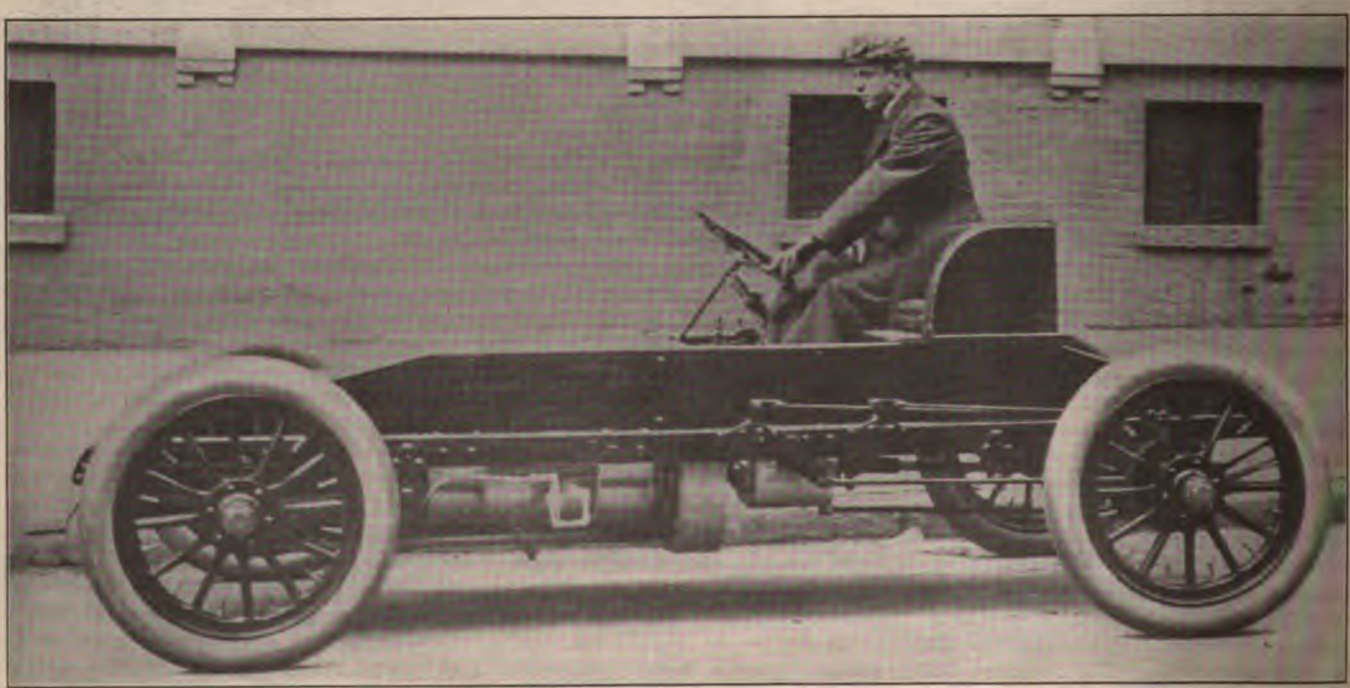
A double acting brake acts on the compensating gear on the rear axle.

All the machinery is mounted on an angle steel frame, to which the body is fastened by eight bolts. The body can therefore be easily dismounted for getting at the machinery, if that should be necessary. The wheel base of the car is 72 inches and the tread is standard. The body is mounted on full elliptic springs, both in front and rear. The seat of the body has a solid back, and the compartment in front is entirely free for carrying clothes, etc., when touring. The seat is extra wide and is trimmed with leather. The motor is started from the seat and the transmission is controlled by a single lever.

The Winton Racer.

The accompanying half tone is an illustration of the new Winton racer, which was built to compete in the Gordon Bennett Cup Race. Should the vehicle be accepted by the trial committee it will no doubt be one of two cars driven by a horizontal engine, as all the other machines entered will most likely be propelled by vertical motors.

The Winton racer is rated at about 40 horse power and weighs less than 1,900 pounds without water, gasoline and batteries. It has a wheel base of 100 inches and a standard tread. The frame is of the armored wood type and rests on four semi-elliptic springs. The front axle is a solid forging and the rear axle is of the live type and bevel gear driven. The wheels are shod with 32x4 inch Goodrich clincher tires. The body of this machine resembles that of the "Bullet," which had vertical engines and a hood in front. The centre of gravity is extremely low and the flywheel has but 6 to 7 inches road clearance. The



Percy Owen in His Winton Racer.

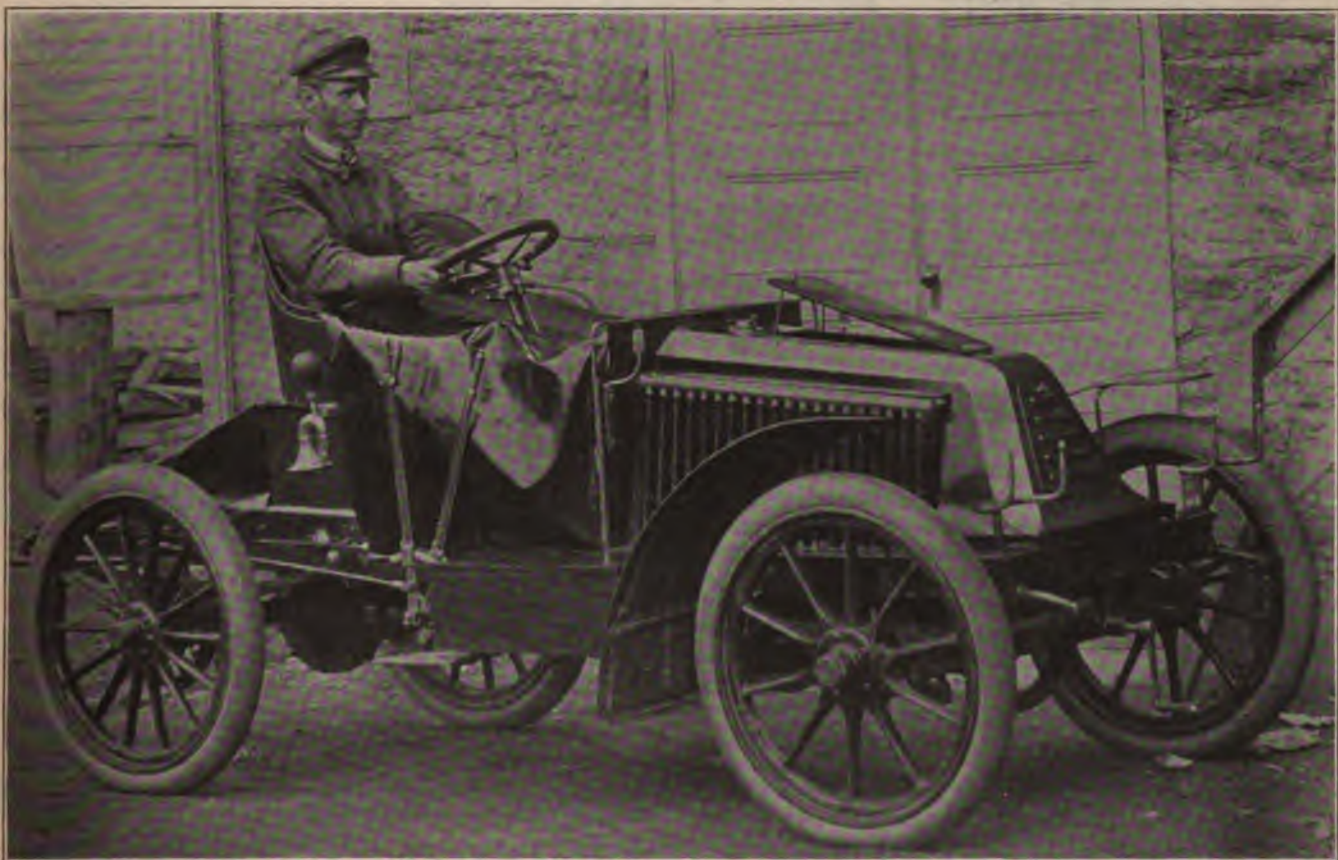
crank shaft is on the left hand side and the cylinders on the right hand side. They are four in number and are fitted with jump spark ignition, the plugs being screwed into the heads in such a way as to be readily accessible, without even raising the lid that covers the engine. The carburetor is located on the outside of the frame in such a way that it may be regulated by the operator while driving.

The cylinders are water cooled and a flanged coil of forty-two tubes is provided. The water and gasoline tanks are in front. The capacity of the latter is 15 gallons. The change speed gear gives but two forward and a reverse speed, and a conical friction clutch is used. The gear box is hardly longer than the width of the flywheel's face, and, like the crank case, is an aluminoid casting. The control devices consist of a wheel (mounted on a solid steel steering post), a change speed lever, a foot pedal and a lever to apply the emergency brakes. All of the brakes are double acting and act on the brake drums of the drivers. The foot pedal applies expanding ring brakes and the hand lever controls the brake bands. A small lever to advance the spark is also provided. At the recent preliminary trial at Garden City, L. I., Mr. Owen's car is said to have covered 6 miles in 5 min. 54 sec.

Dr. Charles Howard, of St. Paul, Ind., was killed and Richard Rice was seriously injured on April 18 by their automobile colliding with a street car at Indianapolis.

Thirty Horse Power Ward Leonard Touring Car.

The illustration herewith shows the 30 horse power touring car of the Ward Leonard Electric Company, of Bronxville, N. Y. The car, which is shown in racing trim, is equipped with a four cylinder vertical motor, with mechanically operated inlet and exhaust valves. The governor acts upon the admission. Water circulation is by thermo-siphon action, the radiating tubes being plainly seen at the side of the bonnet. The transmission gear gives four speeds forward and one reverse, and embodies a novel feature—it drives direct on the third or second highest gear. As the highest gear is too high for ordinary use, the second highest gear will commonly be used in touring, and it is, of course, an advantage to drive direct on that gear which is used the most. The drive to the rear axle is by bevel gears. All the bearings of the car have forced lubrication and two independent, double acting, dustproof brakes are provided.



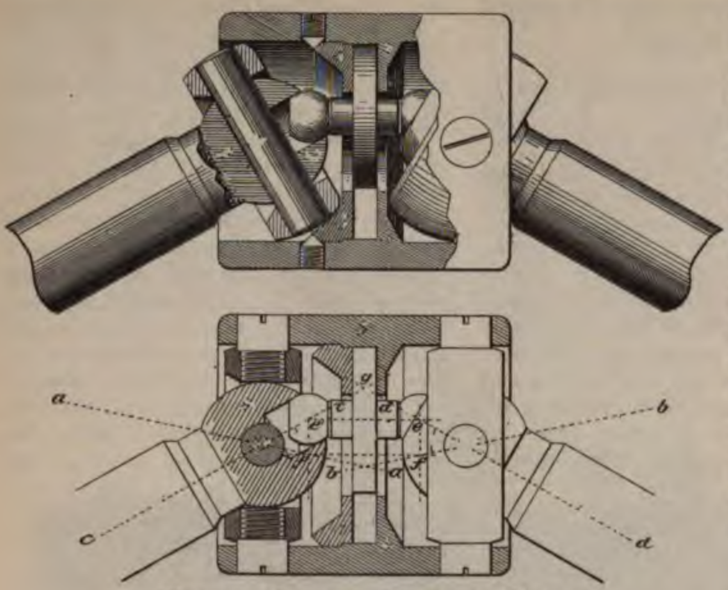
THIRTY HORSE POWER WARD LEONARD TOURING CAR.

Williams Improved Universal Joint.

It is well known that where two shafts are coupled by a single universal joint, like the Hooke joint, for instance, with their axes inclined to each other and uniform rotary motion is imparted to one the other will not revolve with a similar uniform velocity; on the contrary, during one quarter of its revolution its velocity will progressively increase and during the next quarter it will correspondingly decrease, followed by a like accelerated movement through the third quarter and a similar decreasing velocity through the last quarter.

It has also been demonstrated that if an intermediate revoluble member be interposed between the two shafts, with the ends of which the ends of the respective shafts be coupled by universal joints, a velocity may be imparted to the driven shaft through this intermediate member, which will be synchronous with that of the driving shaft as long as equiangularity between the axis of the intermediate member and the respective axes of the two connecting shafts is maintained. When this equiangularity is preserved in action and the velocity of the driving shaft is regular and uniform, the velocity of the intermediate member will exhibit the irregularity above described; but by reason of the similar but inverted conditions appertaining to the transmitting connection with the driven shaft this irregular velocity will be transmuted into a velocity which will be both concurrent and synchronous with that of the driving member.

A patent has recently been granted to Harvey D. Williams, of Washington, D. C., for a double universal joint in which this object is accomplished by introducing a supplemental loose coupling member which parallels the positive or driving coupling, and which connects the two shafts by telescopic joints at points in their axes equidistant from the centres of the



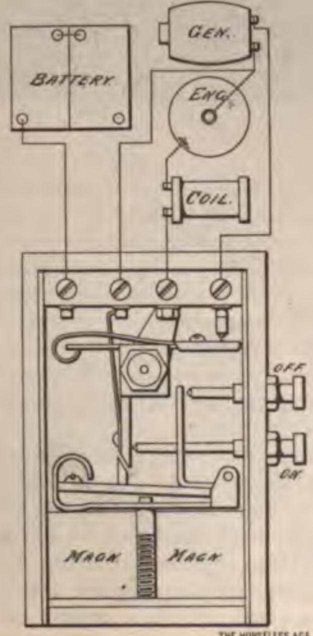
WILLIAMS IMPROVED UNIVERSAL JOINT.

positive coupling joints. These two intermediate coupling links are also fitted with a co-operative device which maintains constant axial parallelism between them and prevents endwise movement of one with reference to the other.

The connecting part comprises two members, one contained within the other. The outer of these, called the "coupling," has each of its ends positively connected by some universal connection with the shaft section, and the other member, called the "equalizer," is capable of sliding in a plane perpendicular to the axis of the former and couples with the shafts by a joint, which will permit longitudinal movement of one part upon or within the other, akin to a ball moving within a tube.

Referring to the illustrations of the joint herewith, the centre lines *a a*, *b b*, etc., in the lower drawing indicate the limits of angularity of the connected shafts. It is obvious without further explanation that the angles between the intermediate piece and the two connected shafts must always be equal to each other. The construction also appears to be excellently adapted to be protected by leather casings, as is now generally thought necessary for universal joints for automobiles, and to be filled with lubricant.

This joint is manufactured by the Waterbury Tool Company, of Waterbury, Conn.



GREGORY IGNITION BATTERY CUT-OUT.

The Gregory Automatic Ignition Battery Cut-out.

This cut-out switch, manufactured by the Auto-Device Manufacturing Company, 79 Dearborn street, Chicago, is designed for use with gasoline engines, the ignition current of which is furnished by a battery in starting and a mechanical generator in normal operation.

Before starting the engine a button in the auto-switch is pressed, which connects the battery to the engine, and the dynamo to a magnet in the switch. At the same time a spring is compressed, which is released by the magnet as soon as the dynamo generates enough current, which automatically cuts the battery out; cuts the dynamo out from the magnet circuit and turns all the dynamo current on to sparking the engine.

If desired to stop engine by cutting out the spark, another button is pressed, which breaks all circuits until the pressure is released, when it automatically leaves the dynamo in circuit with the engine, where it remains until it is desired to start the engine again. As stated, the coils are cut out simultaneously with the battery, and a current flows in the coils only momentarily in starting the engine. The device is encased in a hard rubber box 1¼x2½x3¾ inches, the top being provided with a glass to see the operation of the switch.

A New Radiator.

Frank H. Stolp, of 541 Carpenter street, Chicago, is marketing a flanged radiator with a continuous spiral flange, in place of the usual disks. The flange is made from a straight strip of sheet copper, which is crimped at one edge to give it the form of a spiral just fitting over the tube. This radiating tube can be made entirely by machinery. The crimping of the flange, although a necessity with a flange made of a straight strip, possesses the advantage that it increases the amount of metal in the flange near the tube where the greatest amount of heat has to be transmitted.

This radiator tube is made in one size only, with a three-quarter inch brass tube and a flange of 1¾ inches outside diameter and weighs about 9 ounces to the foot. The manufacturer claims that weight for weight twice the amount of heat can be radiated with this radiator as with disk radiators. Radiators are made complete with aluminum headers and all the tubes in parallel. There are no soldered joints in these radiators, which are said to be of neat and strong construction. The spiral flange is soldered to the tube.

Veeder Adjustable Spark Gap Device.

The Post & Lester Company, of Hartford, Conn., manufacture the adjustable spark gap device illustrated by the accompanying cut, which can be attached to the dashboard of the vehicle. The device is claimed to absolutely prevent trouble from sooty plugs or from an excess of cylinder oil accumulating on the plug. The device

is made of brass, highly finished, and mounted on a polished hard rubber base. The company also offer a "compensator," the use of which they advise where the operator wishes to place the spark gap device in a position where he can see the spark.

Trade Literature Received.

Hartford Tire Booklet.—Hartford Rubber Works Company, of Hartford, Conn.

Rolls & Co.'s Delivery Van and Doctor's Phaeton.—C. S. Rolls & Co., Lillie Hall, Earl's Court, London, S. W.

"Rigs That Run."—St. Louis Motor Carriage Company, Vandeventer avenue, St. Louis, Mo.

Parts, Fittings, Sundries, Tools, Clothing, American and European Novelties, &c.—Charles E. Miller, 97 Reade street, New York city.

Commercial Light Electric Vehicles. Motors and Storage Batteries.—The Imperial Automobile Company, of Detroit, Mich.

The Clarkmobile Touring Car.—The Clarkmobile Company, of Lansing, Mich.

The Panhard Spark Gap.—The Auto Novelty Company, of 946 Prospect street, Cleveland, Ohio.

..COMMUNICATIONS..

Era of Organization and the Selden Patent.

Horseless Age:

automobile industry is now on an d basis, now we are to see the clash vidual interests, and, we should hope xpect, the ultimate adjustment of ty rights upon a just and assured Now comes "the times that try souls," if they are editors, but we ook for The Horseless Age to confirm in the right as God gives it to e right.

r Play" asks "pointed questions," ere are probably a considerable numnat would be interested in a final r to them.

btless the Patent Office and the in the administration of the patent ake some mistakes. The Supreme has remarked that the judges are rfectly adapted to the determination stions involving mechanical and sciprinciples, and the statutes have framed so as to afford a possible y. Engineers and scientists complain administration of the patent laws, eir words are listened to throughout ilized world. But what do they do l remedying the defects they point

he writer, who has had some experiit seems that the wonderful thing is at mistakes are made, but that, on hole, legal rights are so well and established. Our Patent Office is a of just pride, and the character and g of our federal judges are univerecognized and honored.

ever, infallible wisdom does not exist man or any body of men. The Patommissioner who said of the Selden that it "may be considered the pionvention in the application of the ession gas engine to road or horserriage use" also swept away or reed with one stroke of his pen almost e rules of practice of the United Patent Office that had long been shed by custom and numerous pubdecisions of the Commissioners. The were happily restored in a few s; what will become of the Selden ? This Commissioner also remarks: steam engine * * * is not suitalight passenger vehicles."

n Watt and Boulton had at length d success, their rights were conin a famous legal contest which did forever with the idea that patents njurious monopolies, and established rm basis the principle that the inis a public benefactor, and that the should see that his rights are recd.

It is to be remembered that Watt's efforts were impeded by the patenting of the combination of the crank with a steam engine, though no "trust" secured the crank patent to use it "to maintain the mechanical standard of the art and protect its members from ruinous litigation," and to that end to accumulate a fund from those same members much in excess of the highest estimate of the cost of litigation.

THE SELDEN PATENT.

The first claim of the Selden patent is as follows:

"1. The combination with a road locomotive, provided with suitable running gear, including a propelling wheel and steering mechanism, of a liquid hydrocarbon gas engine of the compression type, comprising one or more power cylinders, a suitable liquid fuel receptacle, a power shaft connected with and arranged to run faster than the propelling wheel, an intermediate clutch or disconnecting device and a suitable carriage body adapted to the conveyance of persons or goods, substantially as described."

Of the elements of this claim there will be no question that the running and steering gear were old, that a liquid hydrocarbon engine was old and that the driving wheel and the fluid receptacle were old. It is thought that Lenoir applied a gas engine to a road vehicle in 1860. At the time of filing the Selden application gas engines had long been in use, and with them it is necessary to use a connecting and disconnecting device. In United States patents, No. 183,177, to J. M. Sauck, dated October 10, 1876, and patent No. 111,644, C. W. Hermance, February 7, 1871, are shown steam engines on road locomotives, the shafts of which are arranged to run faster than the driving wheels, and clutches for connecting and disconnecting the engine with the driving wheels. This would seem to leave merely the compression feature as the novelty.

Of course compression in a gas engine was not new, only the application of an engine having the compression feature to a road wagon could be claimed as a novelty. Is this patentable under the law?

Chief Justice Taney, in delivering the opinion of the Supreme Court in O'Reilly vs. Morse, spoke in part as follows:

"No one, we suppose, will maintain that Fulton could have taken out a patent for his invention of propelling vessels by steam, describing the process and machinery he used, and claimed under it the exclusive right to use the motive power of steam, however developed, for the purpose of propelling vessels. It can hardly be supposed that under such a patent he could have prevented the use of the improved machinery which science has since introduced, although the motive power is steam and the result is the propulsion of vessels. Neither could the man who first discovered that steam might, by a proper arrangement of machinery, be used as a motive power to grind corn or spin cotton, claim the right to the exclusive use of steam as a motive power for the purpose of producing such effects.

"Again, the use of steam as a motive power in printing presses is comparatively a modern discovery. Was the first inventor of a machine or process of this kind entitled to a patent, giving him the exclusive right to use steam as a motive power, however developed, for the purpose of marking or printing intelligible characters? Could he have prevented the use of any other press, subsequently invented, where steam was used?"

Now is there any need of an association to "maintain the mechanical standard of the art," and will such an association have a beneficial influence?

This is the shibboleth of every combination which is organized to crush out competition.

A manufacturer with a continuous demand for his product up to the limit of the capacity of his plant has little incentive to use better material, or more expensive modes of manufacture. I have observed that in several instances—all that I have data in regard to—those just entering the field of automobile manufacturing do so because they think better material, better workmanship and improved engineering methods should be used.

Is not an attempt to discourage such manufacturers an injurious attempt to prevent the beneficent incentive that comes through competition?

E. J. Stoddard.

Denies That Charleston Streets Are Strewn with Broken Glass.

Charleston, S. C.

Editor Horseless Age:

You will find enclosed a clipping from your issue of last week, regarding broken glass on our streets. I do not know who your informant is, but I think that he is either guessing or has some spite against our city.

I owned and operated an automobile here for about eighteen months, and during that time only had one puncture, which was received from a nail outside the city limits. I am now about to buy another machine, which would be of no use to me if the conditions here were as stated in your article. It is true that much of the liquor is sold here in bottles, but these bottles are bought by dealers, who sell them back to the dispensary. S.

New Method of Operating Dry Cells for Ignition.

Editor Horseless Age:

I have seen in your columns more or less complaint with reference to the inefficiency of dry batteries for gas engine ignition. In an experience extending over a year with an Oldsmobile I have secured very good results from the regular equipment of eight dry cells. I find that after

running 200 or 300 miles the battery usually appears to be considerably weakened, but as a matter of fact the trouble is generally somewhere else, and by polishing up the contact points on the vibrator of the spark coil with emery paper or fine sandpaper and readjusting the coil, I find my batteries almost as fresh as at first. By repeating this process every 200 or 300 miles, or whenever it seems necessary, I can secure about 1,000 miles from the one equipment of battery, coupled up as they are regularly in two sets. When I find my battery has been exhausted to a point where it cannot be used any longer connected in this way, I change the connections so that I have six cells in series on the front button and eight cells in series on the back button of the switch. In this way I use the six cells as long as they will do the work, and then switch on to the eight cells, and when these finally fail I am quite ready to put in a new outfit of batteries. By working my batteries to the limit in this way I can get from 1,200 to 1,500 miles from a set of eight of the regular commercial dry cells, which can be purchased at retail for about 25 cents per cell. This, I think, is a very satisfactory showing. THOS. I. STACEY.

Attorney General the First Victim.

MORRISTOWN, N. J., April 17.

Editor HORSELESS AGE:

I enclose you a clipping from the New York *Journal* of April 15 regarding the arrest of Attorney General McCarter. The policeman was the same that arrested the writer on November 16, 1902, and sent him bill of costs and fine before charges were preferred. The squire before whom the Attorney General was taken was the same one that fined the writer, and seemed to have a particular grudge against automobilists. As I understand it, this arrest was made and fine imposed under an old borough ordinance, in spite of the fact that the Attorney General tried to explain to Justice Cook that that ordinance was void since the State law went into effect, March 23. I should think that he made a great mistake in paying the fine instead of contesting the case, as it seems to me a man in his position should see justice done regardless of expense or his own convenience. D.

ENCLOSURE.

"Thomas N. McCarter, Attorney General of the State of New Jersey and one of the advocates of the bill recently passed by the Legislature of that State regulating the speed of autos, is the first to come under the ban for an alleged violation of that law. He was arrested at Madison Sunday night by Policeman Ryan and fined $27.60 by Justice of the Peace Cook, of that town.

"He refused to pay the fine, claiming he was not running beyond the speed allowed by the statutes. Dr. Leslie D. Ward, vice president of the Prudential Insurance Company, was telephoned to, and went on the Attorney General's bond pending an appeal.

"Since then Mr. McCarter changed his mind, and paid the fine and withdrew his appeal. The story became known yesterday.

"Mr. McCarter was speeding through Madison on his way to Newark when a policeman fired a revolver to halt him."

Automobile Roads.

Editor HORSELESS AGE:

From time to time, as is inevitable, accidents caused by automobiles occur. Sometimes they are caused by the other man, but generally the howl is at the chauffeur. Considering the large amount of traffic in the streets of New York and the great number of automobiles traveling therein, I think that it must be conceded that the total of serious accidents is not large. I am a visitor to the city and have been much impressed by the skill of the average New York chauffeur, both professional and amateur. There can be no doubt that the motor car is at a great disadvantage in an ordinary city thoroughfare. Its progress consists of a series of little darts, varied with wearisome waits at the sweet will of the gentlemen in blue who stand at the corners. As a matter of fact the automobile cannot do itself justice on the ordinary roads, especially between or in thickly populated centres.

During my short stay in this country it has been a matter of surprise to me that nothing is being done to provide automobile roads. You have your "speedways," whereon your trotters may extend themselves without risk to themselves, their owners or the general public. Where do the like conditions exist for the automobile? It is thought that the federal capital of Australia may be founded at Orange, in the centre of a vast plain. It has been proposed that motor car roads be laid out radiating from the capital to all centres of population. Why should not this idea be carried out here? Why in this land of huge enterprises should you not have your automobile speedway of 100 miles in length by 5 or 10 chains in width? This would do for a start. You would soon want more. The idea may not be large enough nor profitable enough to commend itself to the automobilists, but there is not of necessity any limit to the extent of the scheme, and I believe that it might in time be made to pay small dividends. Imagine it, ye knights of the devil cars—"an automobile road to San Francisco"! Think of it!

P. A. VAILE,
Auckland, New Zealand.

American Gasoline Automobiles in Great Britain.

153 FARRINGDON ROAD, LONDON, E. C.,
April 8, 1903.

Editor HORSELESS AGE:

I have renewed my subscription to your valuable journal with your London house in Ludgate Circus, and beg to advise you that I am now in the automobile trade.

I have had about five years' experience in following the evolution of cars driven by internal combustion engines in Paris, am a qualified engineer, and have the firm conviction that sooner or later American light petrol cars made in quantities are bound to come to the fore.

There is a great sale for such in this country, and I am looking out for an agency for a car of the ——— type, and hope to be able to open business with a firm desiring a go-ahead representative in this country.

If you can put me in touch, or, better still, ask some of your friends handling this type of car to get into communication with me at above address, I shall be extremely obliged.

S. ARNOLD MARPLES.

Touring Restricted by Legislation.

BALTIMORE, April 14.

Editor HORSELESS AGE:

Would you mind giving me some information which I believe is of so great interest that a general statement would be very valuable if printed in THE HORSELESS AGE? I contemplate a tour from Baltimore through Pennsylvania, New Jersey, New York, Connecticut, Rhode Island, perhaps, and Massachusetts, leaving Baltimore early in June. Nearly all these States have either already passed or contemplate passing laws regulating the use of automobiles. The New Jersey law, for instance, if I remember rightly, requires a license to be issued by the Secretary of State, with the number of the license in large figures, posted on the back of the machine. Connecticut, I believe, has or will have a similar law. New York State requires the initials of the owner in large letters on the back of the machine. Pennsylvania has some special requirements, and in nearly all these States there is a license fee.

Now, does this mean that before I can take my trip I must first communicate with the Secretary of State, for instance, of New Jersey, pay the license fee to go across the State, get a card painted with the special numbers for the rear, and do similar stunts for all the other States that I expect to go through? If this is what I will have to do then I predict that touring will receive a tremendous setback, because very few will want to go to all this trouble, and besides they will have to take an extra carriage along to carry the signs and other paraphernalia that seems to be necessary. Four or five owners of carriages here in Baltimore have been talking the matter over with me, and we thought it would be well to communicate with you. We differ in our views. Some assert that to require a special fee and all this special attention to details in all the States would be ridiculous, and could not be enforced. If the law means what it says I believe it can. H. M. ROWE.

[The subject was referred to editorially

ir last issue, and is of great impor-, as undoubtedly many automobilists be put to great inconvenience the ig summer by the requirement of ration in the different States. The should be so framed that the authori-f one State recognize a certificate of ration issued by another and require her identification signs than those de-ed by law in the home State of the t. This is the rule observed by the rities in Germany. There the speed and other details of the law vary in ifferent States, but if a tourist can y the police authorities that he has ied as a competent operator and out a license in his home State he is iolested.

present a tourist in New Jersey must a description of his machine to the tary of State, pay a license fee, obtain nse number and carry the same at ack of the vehicle. In New York urist must also pay a license or reg-on fee, register and carry his initials back of the vehicle. If the bill now ng should be adopted license num-will have to be carried instead of in-

At present no registration is re-l in Pennsylvania, Connecticut and chusetts, but bills requiring registra-are pending. It appears, however, a Connecticut tourists will not be re-l to register if they have registered ir home State.—ED.]

age Accommodations During Gordon Bennett Race.

DUBLIN, April 10.

HORSELESS AGE:

would point out to you that in prep-n for the Gordon Bennett race we nade arrangements in Dublin for the modation of over 200 cars, and would ighted to accommodate any motor-ith this room free of charge if they avail themselves of it.

are also issuing post free to all who for it a map of the course giving a leal of useful information as to gaso-ations, etc. We shall be glad to for-same to any of your readers if they to us.

have a large staff of mechanics con-in our garage at 115 Summerhill, y motorists coming over from Eng-n get a small repair done while they r larger ones in the very shortest of time, along with good work.

HUTTON, SONS & Co.

The Lang Igniter.

HORSELESS AGE:

rring to the seeming disadvantage out in your notice of my igniter, I say that it is more imaginary than or the reason that, where used on ss of machines mentioned, it should nected with the throttling mechan-that it is moved simultaneously th, when the objection is overcome. It moreover responds instantly to proper movements, as there is no new portion of metal to be heated, as is the case with the valveless hot tube when its time of ignition is to be changed.

The efficiency of this method of ignition may be demonstrated by a very simple experiment, with any engine having a suitable exhaust passage, by rolling up a coil of sheet iron, wrapping it with a piece of asbestos paper and inserting it in the valve passage.

In fact the first experiment ever tried in this direction was to wind up a spherical ball of about No. 15 iron wire, a little larger than the exhaust passage into which it was forced. After the insertion of the ball, without any asbestos protection whatever, it was found, with an air cooled motor, that it was impossible to obtain a misfire.

J. S. LANG.

Who Makes This Molding?

Editor HORSELESS AGE:

Kindly advise us of whom we can buy brass molding for trimming automobiles. The molding wanted is half round and oval shaped, filled with lead, so that it can be bent into different shapes. It is ready to tack on as it leaves the factory.

M. G. E. Co.

[We shall be glad to forward replies.—ED.]

Unsafe Wheel Steering.

Editor HORSELESS AGE:

Wheel steering is a necessity on all heavy and fast cars, and is probably necessary on fast cars whether heavy or not. When it comes to the typical light American runabout, however, the writer sees no advantage in abandoning the well proved side lever. Whether he is right or not in this opinion, he desires to enter a vigorous protest against the particular combination of steering and control found on most of this year's runabout models. In order to ape the French, or for some other unknown reason, the 1903 runabouts are generally being equipped with a wheel. But the French imitation stops here. No pedal is provided to unclutch the engine. In order to stop the machine one must steer with one hand and pull out the clutch with the other. Now, everybody who has tried wheel steering knows that it is nearly impossible to make a quick turn approaching a right angle, even at a very moderate speed, unless one has both hands free to pass the wheel around. Yet to avoid accidents in crowded traffic it is often necessary to make wide deviation and at the same time unclutch.

If the wheel is to be forced upon us, let us at least have the control so arranged that we may have both hands for steering when we get into a tight place. But better still, stick to one hand steering by a lever for vehicles of 1,500 pounds or less and with a speed of not over 25 miles per hour.

C. W. M.

Explosive Engine Query.

Editor HORSELESS AGE:

Can you tell me at what compression a perfect mixture of gasoline and air will ignite by compression alone, the temperature of engine and air to be 70° Fahr.?

M. M. JACOBS.

[This question is very frequently asked, but it is unanswerable, as the compression at which ignition takes place spontaneously depends largely upon the nature of the vessel in which the compression takes place. If there are any protruding metal parts in the cylinder there may be spontaneous ignition at ordinary compression, the protruding part remaining incandescent from one explosion to the next. In our last issue was described an ignition system based on this principle, in which a coil of sheet platinum in the valve passage remains incandescent from one explosion to the next.

The question can only be answered on the assumption that the heat generated by the compression remains entirely within the charge, and that this heat, and not heat stored in metal parts, effects the ignition. The case is rather an ideal than a practical one, however. The Diesel Company, who use self ignition, employ an average compression of 36 atmospheres, or about 530 pounds per square inch, in the combustion chamber—a little more for small engines and a little less for large ones.—ED.]

Explosive Engine Query.

Editor HORSELESS AGE:

I find that one dealer in New York city who is selling a two cylinder motor has the springs on his inlet valves at different tensions, claiming it is necessary on a two cylinder motor.

I claim that the springs should be of the same tension whether there are one, two or four cylinders.

MOSE.

[The springs should be of the same tension if the valves are machined alike.—ED.]

Rules and Regulations of the Commercial Vehicle Contest.

(Condensed.)

VEHICLES ELIGIBLE FOR THE CONTEST.

The contest will be open to types of self propelled vehicles used for commercial purposes made in the United States or abroad. Entry blanks will be forwarded by the club secretary upon request, and must be filled out in full.

ENTRIES.

The time for receiving entries will expire on May 10, 1903.

All entries must be accompanied by the following information in full:

Weight of vehicle, including fuel, supplies and equipment; maximum dead load that vehicle can carry; capacity; water, gasoline, kerosene, fuel oil, coal and coke; name of manufacturer; place of manufacture; tires, make and size; motive power; rated horse power of motor and

number of cylinders; selling price of the vehicle.

ELECTRIC VEHICLES.

Weight of battery; number of cells; ampere hour capacity.

ENTRANCE FEES.

The entrance fee for all classes will be $25 for each vehicle, and must be forwarded to the club secretary with the entry. In the event of the vehicle being disqualified or failing to take part in the contest the entry fee shall be retained by the club. No entry will be received unless accompanied by the entrance fee. A full description and photograph of the vehicle must accompany the entry.

CLASSIFICATION.

All vehicles, whether electric, steam or gasoline, shall operate in the same class, which classification shall be on the basis of dead load carried.

There shall be divisions for electric, steam and gasoline vehicles. All vehicles shall be sub-divided into five classes, as follows:

First Class—To carry a dead load of 750 pounds.

Second Class—To carry a dead load of 1,500 pounds.

Third Class—To carry a dead load of 3,500 pounds.

Fourth Class—to carry a dead load of 6,000 pounds.

Fifth Class—To carry a dead load of 10,000 pounds.

Sixth Class—To carry a dead load of 20,000 pounds.

Each vehicle must carry a dead load of at least 50 per cent. of its own weight with all supplies on board in addition to the driver and observer.

A vehicle may carry 300 pounds in excess or 300 pounds less than the specified dead load for any class, provided the dead load carried, exclusive of the driver and observer, shall be at least 50 per cent. of the weight of the vehicle.

Electric vehicles shall be allowed one stop for recharging batteries, the time of such stop and the amount of current taken to be recorded against the vehicle. Ampere meter and volt meter readings will be taken each day before and after the run, and before and after all intermediate rechargings.

Time taken by steam and gasoline vehicles for replenishing water and gasoline supply will be charged against the vehicle.

LOAD.

Each contestant shall furnish his own dead load, consisting of whatever material he may see fit to carry, which will be weighed and checked by the contest committee and shall not be changed during the continuance of the contest.

Arrangements for taking water will also be made by the committee at the starting station and at intermediate points on the route, 10 miles apart.

DURATION OF THE CONTEST, DISTANCE AND ROUTE.

The contest shall cover two days—Wednesday, May 20, and Thursday, May 21. The distances to be covered shall be as follows:

First, Second and Third Classes.

Forty miles each day as follows:

First Stage—From clubhouse to Fort George, Washington Bridge, Jerome avenue, Seventh avenue, to clubhouse, 20 miles.

Second Stage—From clubhouse to the Battery and return, 10 miles.

Third Stage—From clubhouse to the Battery and return, 10 miles.

Total, 40 miles.

Fourth, Fifth and Sixth Classes.

Thirty miles each day, as follows:

First Stage—From clubhouse to Fort George, Washington Bridge, Jerome avenue, Seventh avenue, to clubhouse, 20 miles.

Second Stage—From clubhouse to the Battery and return, 10 miles.

Total, 30 miles.

A compulsory stop of ten minutes will be made at the end of each stage.

OBSERVERS.

Each vehicle shall carry an official observer, to be furnished by the club, to note the performance of the vehicle, fuel and water consumption, etc., and no repairs will be permitted without his knowledge and record of the same.

SIGNS AND NUMBERS.

Each vehicle will be allowed to carry a sign of such size and character as its maker may determine, which should state the name of the maker and the amount of load carried.

Official numbers, which must be carried on the vehicle during the contest, will be furnished by the club.

THE STARTING OF THE CONTEST.

All vehicles entered for the contest must report on Wednesday morning, May 20, at 8 a. m., with their dead load on board, in running and operating condition, with their tanks full, at the weighing station, where they will be weighed by the committee's representatives, and gasoline, water tanks and fuel bunkers examined, and any shortage replaced, so that they will contain their full capacity at the time of starting.

Ampere meter and volt meter readings will be taken for electric vehicles.

The vehicles will then line up on Fifty-eighth street, irrespective of numbers, and be started at three minute intervals.

COST OF OPERATION.

Gasoline, kerosene, fuel oil, electricity, coal or coke consumed shall be furnished by contestants, and its amount will be measured and the cost of operation per ton mile ascertained.

Where coal or coke is used as fuel it must be carried in bags, or in such form as can be conveniently weighed and checked by the committee's representatives.

WEIGHING OF VEHICLES.

All parties making entry for the contest shall appear before the committee of the Automobile Club on Tuesday, May 19, between the hours of 9 a. m. and 6 p. m., with their vehicles in commercial running and operating condition, with tools, fuel and supplies on board, *but without dead load;* they will receive their official numbers and proceed to the weighing station designated by the committee and have their vehicles weighed in that condition (without the driver) and an official seal affixed thereto. They shall also be required to appear at the weighing station with their dead load on board on each morning of the contest to be weighed and checked by the committee's representatives.

DISQUALIFICATION.

The committee reserves the right to disqualify any contestant for any infraction of these rules.

NIGHT STORAGE.

All vehicles shall be stored over night at the depot provided by the club. They shall be delivered to the custody of the committee's representatives at the end of the first day's run and remain in their custody until taken charge of by the official observer on the morning of the second day.

PASSENGERS.

Contestants may carry passengers (in addition to the driver and observer) at their option, but the weight of such passengers will not be included as part of the dead load.

STOPS.

On the first day of the contest each vehicle shall cover the route prescribed for its respective class without stops, except those that are involuntary and those which are provided for at the end of each stage.

On the second day of the contest each vehicle shall cover the same route traveled on the first day, and will be required to make specified stops as follows:

First Class—750 pounds dead load, electric, steam or gasoline, 100 stops.

Second Class—1,500 pounds dead load, electric, steam or gasoline, 100 stops.

Third Class—3,500 pounds dead load, electric, steam or gasoline, fifty stops.

Fourth Class—6,000 pounds dead load, electric, steam or gasoline, twenty-five stops.

Fifth Class—10,000 pounds dead load, electric, steam or gasoline, ten stops.

Sixth Class—20,000 pounds dead load, electric, steam or gasoline, five stops.

(A schedule of where stops are to be made will be handed to contestants several days before the contest.)

The vehicles will be required to pull up to the curb and come to a full stop.

The observer will not begin to make the record until the wheels have stopped, and the vehicle will not start again until the observer has completed his record.

AWARDS.

Medals will be awarded, based on econ-

cost of operation and time con- covering the route, as follows:

ound Class—A gold medal to the making the best performance; a dal to the vehicle making the sec- performance; a bronze medal to le making the third best perform-

Pound Class—A gold medal to the making the best performance; a edal to the vehicle making the est performance; a bronze medal ehicle making the third best per- .

Pound Class—A gold medal to the making the best performance; a dal to the vehicle making the sec- performance; a bronze medal to le making the third best perform-

Pound Class—A gold medal to the making the best performance; a edal to the vehicle making the est performance; a bronze medal ehicle making the third best per- .

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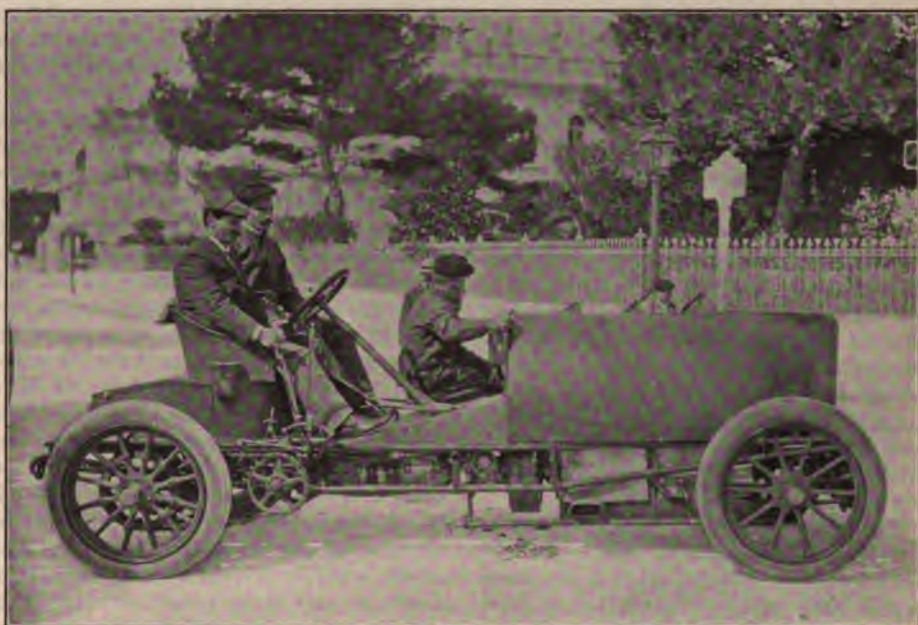
Pound Class—A gold medal to le making the best performance; medal to the vehicle making the est performance; a bronze medal ehicle making the third best per- .

nsumption Trials and Mile Kilometre Races at Nice.

nday, April 5, a fuel consumption n a novel plan was held at Nice. mpetitor received 100 grams of per 50 kilograms of total weight e in running order. The contest on the Place des Armes, which converted into a sort of track urpose, grand stands having been a band provided and other ar- nts made to offer every attraction ublic. The weather was exceed- e, but the attendance was not as had been expected. The results were also considerably behind corded in the consumption trials is recently. The greatest distance ilometres) was covered by Fr. de ho drove a 6 horse power Re- icle weighing 945 kilograms (2,080 the amount of fuel furnished him ilogram. Second place was taken alon, who drove a 6 horse power , weighing 541 kilograms, 31.483 s on 1.08 kilogram of gasoline. ere twelve competitors, and the he class, who, curiously enough, e a Renault car, drove it only 13 s, or about 8 miles.

eady reported, immediately upon dent to Count Zborowski the Minister of the Interior, M.

General View of Fuel Consumption Contest.



120 Horse Power Gobron-Brillie on the Boulevard des Anglais.

Serpollet in His 40 Horse Power Steam Racer on the Boulevard des Anglais.

Combes, prohibited the completion of the La Turbie hill climbing race, and also forbade the holding of the mile and kilometre races on the cement track of the Boulevard des Anglais. An urgent appeal was made, however, by the Automobile Club of France, and the interdiction of the mile and kilometre races was finally withdrawn. These races took place on Tuesday, April 7, at 5 o'clock a. m. The mile standing start was won by a 60 horse power Mercedes belonging to Alfred Harmsworth, the time being 1m. 3.72s. Another Mercedes won second place; a Mors third and a Serpollet fourth. A photo of Serpollet's car, which won in the kilometre flying start race, is shown herewith. The chassis is the same as that exhibited at the Grand Palais last winter, but the body has been designed upon new lines. The sides sweep round from the tall rakish bow, and meet in a short vertical stem. The top is an inclined plane from the front to the back, with just the usual aperture in the middle for the driver and his mechanician; and behind, the chimneys of the kerosene burners are flush with the plane. A glance at this design suggests that, after the air has been cut by the bow, there is nothing behind it to offer any further resistance; not only so, but as the air rushes in over the top of the plane and behind the car, it must help in the propulsive effort. The inclined horizontal plane is an entirely new application of a principle which is seen in the form of the boat, since both the straight and curved lines serve to cut the air and create a rarefaction behind. All the wheels are covered with sheet iron.

The other illustration shows the 100 or 120 horse power Gobron-Brillie car. M. Serpollet won the flying start kilometre race in 29.19 seconds. This makes the third time in succession that he has won that race, and thereby became the permanent owner of the Rothschild Cup.

Tryptic Customs Agreement Between England and France.

The A. C. G. B. and I. has made arrangements facilitating the introduction of members' cars into France on the "tryptic" system. The car may be sent over in charge of the driver, the actual presence of the owner not being necessary, though the forms must, of course, be issued in the name of the member and must bear his signature. The owner, after having accurately filled out and signed all the forms, hands them to his driver, who can then carry out all the necessary formalities without his actual presence.

Two members of the club, who availed themselves of these special customs facilities, have arrived back from France, and they both agree in stating that by presenting the tryptic forms at the customs on both entering and leaving the country, all trouble was avoided, for they were allowed to pass through without any delay whatsoever.

...OUR... FOREIGN EXCHANGES

The "Star" Gordon Bennett Cup Racer.

The 70 horse power racer built by the Star Motor Company for the Gordon Bennett Cup Race and exhibited at the Agricultural Hall show is described by the *Autocar* as follows:

The wheels are 34 inches in diameter, with 3½ inch pneumatic tires. The wheel base of the car is 9 feet and the wheel gauge 4 feet 6 inches. The frame exhibits no special features, being of the ordinary steel flitch plate variety, of ample strength. To the forward part of this frame is slung an angle steel underframe running parallel to the gear box, and then branching off to the countershaft bearings under the main frame.

Upon this underframe are set the four cylinder 70 N. H. P. engine and the gear box. The cylinders, which with their water jackets and valve chambers are separate castings, are individually bolted to the crank chamber, and stand thereon, each with one-quarter inch clearance from the other. The stroke of the engine is 6 inches and the bore 6 inches, running normally at 1,000 revolutions per minute, but with the capability of being accelerated to 1,500 revolutions. The crank shaft runs in five bearings, and the central pair of cranks are set at 180 degrees with the outer pair. The outer bearings of the crank shaft have oil boxes, wick fed, and ring lubrication is fitted to all gear shaft bearings. The flywheel, which is very large, is 23 inches in diameter and weighs 90 pounds. The change speed gear enclosed in the gear box gives three speeds forward. The clutch is similar in all respects to the clutch now fitted on the new 15 horse power Panhard cars, made with draw rod inside clutch shaft.

All shafts are hollow, the crank shaft being 2½ inches in diameter. The automatically actuated induction valves are 2½ inches in diameter, and have a lift of three-eighths inch. The bonnet, which is of ordinary rectangular form, is closed in forward by a tier of the Albany cased radiators, with fan forced through draught. A Panhard type of commutator is used, and the circulating pump is gear driven off the half time shaft, and is so placed that it is immediately beneath the radiator. The cam shaft is entirely enclosed in the base chamber. With the exception of the thrust bearings, plain bearings prevail throughout, those at the outer ends of the crank shaft being 7 inches and the inner three 5 inches in length. The drive is conveyed from the countershaft to the road wheels by two 1¾ inch pitch ¼ inch Brampton's chains, which are of the same dimensions—except that the side links are thicker—as those fitted to the 7 horse power Star. These chains and sprockets have been specially made, and weigh only 36 pounds. The engine weighs complete 672 pounds, and the gear box and gear 196 pounds. The total weight of the car is 20 pounds under the 1,000 kilogrammes. All the pins in the car are drilled through. Projecting upward and downward from the inner faces of the front springs are two small semi-elliptic laminated springs with their free ends opposed. These are so placed to prevent plunging.

The cooling is arranged in a somewhat unique manner. From the top of the upper water space round the radiator there runs a large diameter brass tube across the top of the cylinders, with the combustion chambers of which it is connected by lengths of perpendicular tube. This large tube is brought through the dashboard, and there closed in with a thick piece of glass, so that the condition of the water circulation can always be observed. This tube keeps a gallon of water always over the top of the cylinders, and is the return of the heated fluid from the cylinders to the radiator. The cooled water is delivered to the jacket on the exhaust side of the engine, and passes through the water space up to the tube mentioned.

Banquet of the S. M. and T.

The first annual banquet of the Society of Motor Manufacturers and Traders was held on Friday evening, April 3, at the Grand Hotel, Trafalgar square, London. Sir John Thornycroft presided. After the loyal toasts, Mr. Scott-Montagu, M. P., proposed the toast of "The Automobile Industry." He said that Mr. Balfour understood the motor movement, and had asked him to say that he would be glad to do anything he could to help it forward. He referred to Mr. Edge's success on the Continent last year, and said that it marked out an era in English automobilism. It was essential that the people of England should wake up and become convinced that the speed of travel was one of the necessities of national life. The country could be largely helped in this development by the motor trade. The industry in which they were engaged was one of the most important of the present day, and he wished the society every success. With regard to Mr. Wyndham's announcement on the subject of transport in Ireland, he expressed the view that road traction would play a most important part in the scheme, and that Ireland never had a better friend than the motor car movement. Mr. Edge, in reply, said that the motor industry had made great strides in England, and would in the future prove to be of great benefit to farmers. He thought they should strive to make London the motor buying and selling centre of the world. T. P. O'Connor then gave "The Society of Motor Manufacturers and Traders." He remarked that the society was founded in July, 190-, with only twenty of the leading

iacturers of the country; but at the nt time it consisted of eighty. The of the society was to have one single g medium for reaching the world in- of a number of scattered ones. F. R. is responded to the toast. The chair- then presented the society's first gold l to S. F. Edge in recognition of his ces to British automobilism by win- the Gordon Bennett Cup last year on English made car. Other toasts fol- l. During the evening a letter was from Mr. Balfour thanking the so- for their invitation to the banquet, regretting that he was unable to be nt. He wished the gathering every ss.

Panhard-Mercedes War.

cording to the New York *Herald*, rs. Panhard & Levassor a few days notified the director of the Mercedes pany that the carburetors and brakes eir carriages were but copies of those ted by Panhard. M. Charley, the agent for the Mercedes, when seen is connection said: "Toward the end st week I suddenly found my place ed by representatives of Panhard & ssor, a police commissary, a sheriff his clerks, who had come, armed with rch warrant.

fter a few explanations they were n a Mercedes carriage, and after ngs of carburetor and brake had been , the whole company went upstairs and requested to be shown into my where, in a few minutes, my letter ccount books were opened, examined tamped.

fact, it was so quickly done that one l have imagined that the sheriff and lerks had been in my employ for ns.

hen, however, they commenced to ex- the files of letters received I pro- , and a sharp verbal passage at arms place, I maintaining that, as I was an agent and not a partner in the att Company, they were exceeding w.

consultation took place and they with-

nce then I have been waiting quietly. sider the action of Panhard & Levas- s ridiculous, and this is the opinion e Canstatt Company also, which is g me all the necessary documents. u see, our machines made such a showing at Nice that this attitude on art of a rival firm is not surprising. ou will probably see some fun before for the action of Panhard & Levassor ave a reaction, since there is no end tomobile makers using the Mercedes s with impunity."

steam truck of Turgan & Foy ar- at Vienna from Paris on April 2, af- nsiderable trouble on the route.

The Soames Gasoline Engine Throttle.

The Soames car, manufactured by the Langdon-Davies Motor Company, of London, is fitted with a novel form of admission control, which is illustrated by the sectional drawing herewith. The carburetor, which is of the well known Longuemare pattern, is connected by the pipes A and B with the inlet valves of the engine. The pipe A leads into a valve box C, and the passage through it to the pipe B is controlled by a valve D. The rod of this valve is connected through a spring E by the cord F and the screw G with a pivoted drum H, to which a lever I is fixed. The drum H is also connected by the cord F to another spring J, which is attached to the spindle of another valve K. These parts are so arranged that the springs E and J can normally hold both the valves down on their seats against the suction of the engine. The valve D controls the passage of the explosive mixture as already stated, and the valve K allows air to be drawn in past it when the spring J allows it to. The lever L is connected with a regulating lever which lies alongside the steering pillar in front of the driver. By turning this hand lever the drum H can be rotated about its axis, and either the valve D or the valve K can be allowed to open more or less freely. In this manner the explosive mixture can be throttled to the required extent, a braking effect can be obtained or the cylinders can be cooled by the admission of pure air —*From the Automotor Journal.*

The entries in the Paris-Madrid race have reached the number 243, which has been secured by the Wolseley Tool and Motor Car Company, Limited; No. 241 falls to the Eagle Engineering and Motor Company. According to a later report the number has reached 251, and this will probably be the limit, as the entries are now closed.

The German Automobile Association at its recent meeting in Charlottenburg authorized Herr Ernest Neuberg, of Berlin, to publish annually a year book of the German automobile industry, containing (1) the scientific and practical progress of the automobile industry during the past year; (2) a list of accidents, with appropriate criticism; (3) development of the industry and legislation; (4) lists of German, Austrian, English and American patents.

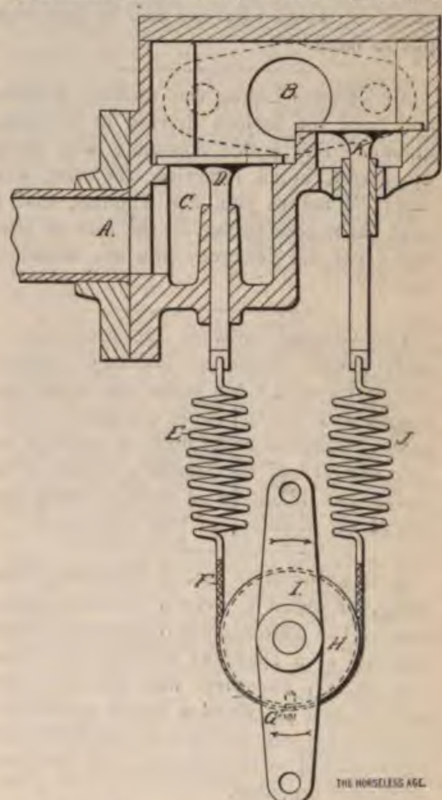
To clean oily spark plugs it is recommended to take them out, pour a little gasoline over the oily parts and ignite it. This will dispose of the oil without leaving any soot.

The German Automobile Club at a recent general meeting fixed its program for 1903, which includes an excursion into the northern parts of the empire, Hamburg and Mecklenburg, in June; a contest of heavy vehicles between Nuremberg and possibly Frankfort and Munich, also in June, and a tourists' excursion to Frankfort and track races there in July.

Edinburgh, Scotland, has just purchased a motor fire engine at a cost of $5,250.

The German Automobile Club, Berlin, has 5 German and 15 foreign honorary members, 334 active, 17 associate and 11 lady members.

The racing committee of the Swiss Automobile Club has fixed the following racing events: Kilometre course on Monday, May 18; international hill climbing race (Corcelles La Tourne) on Sunday, July 5;



Soames Gasoline Engine Throttle.

Swiss hill climbing race on Sunday, August 16. Racing under A. C. F. rules.

Herr Vollmer, a German engineer, recently delivered an interesting lecture before the Berlin Automobile Society on motor cars for fire brigade purposes. The meeting was held at the headquarters of the Berlin Fire Brigade, and attended by the chief commissioner of police and the commander of the fire brigade of the German capital.

Commenting upon the action of the Star Engineering Company in refusing to allow the Wolseley Tool and Motor Car Company to compete in the eliminating trials for selecting the Gordon Bennett Cup defenders, an English daily states: "The Star Company had a perfect right to make this refusal, but its action is regarded

as unsportsmanlike." The implication that the firms who build the Gordon Bennett racers are moved and guided by considerations of sportsmanship is rather naive.

The Society of French Agriculturists offer a prize of 2,000 francs to the vehicle obtaining first place in the general classing of the Paris-Madrid race.

"Automobile Internationale Limited" has been registered in London to acquire the business of the Société Anonyme Dechamps, Brussels, Belgium.

The Wolseley Tool and Motor Car Company have made arrangements with Vickers Sons & Maxim, Limited, to place on the market a light, popular priced runabout, of which 1,000 are said to have been put in hand.

Sir Thomas Lipton was recently arrested and fined for furious driving in his automobile. The police constable who made the arrest, in an interview the next day, said: "I assure you, Sir Thomas, that if your yacht goes as fast in the race as your motor car did yesterday you are bound to win."

The German railways are preparing to carry motor cycles as ordinary baggage and to forward them under the same conditions and for the same charges as other goods. Gasoline tanks must be emptied before delivery of the machine, a fine of 12 marks per kilogram of weight being enforced for violation of this regulation.

In an automobile race at Hamburg, Germany, on April 5, over a 15 mile course, one of the automobiles overturned while running at a speed of 40 miles an hour. The driver, Roessler, was hurled to the ground, and sustained a severe concussion of the brain and fracture of the skull. He was removed to the hospital, and death ensued next morning.

Lorraine Barrow on March 30 returned to Paris from Madrid, where he went with his 24 horse power automobile. He stated that the roads had not been very satisfactory, but he was of the opinion that they would be in first rate order by May 26, the start of the race. Mr. Barrow went to Madrid in fifteen hours' running time from Biarritz. He intends driving a 60 horse power Dietrich in the race.

The Automobile Exposition at Berlin.

The National German Automobile Exposition, which was opened with great éclat at the Flora Garden in Charlottenburg on the 8th of March, has just closed, writes Consul General Frank H. Mason, from Berlin. It was in all respects the most interesting, popular and successful exhibition of the kind ever held in Germany. Not only was the display representative and up to the best modern standard in respect to quality, but for the first time in Berlin the public flocked to see it, and took an active personal interest in the vehicles, and the throngs of visiting automobile clubs and individual "chauffeurs" possessed the streets during the whole period of the exposition. This latest display has suffered less than the several preceding ones from the fact that Berlin, with all its wealth of handsome public buildings, has nothing adapted to a special popular show like an automobile exhibition. The first one, in September, 1899, was held in the "Exercier Haus" in Carl Strasse, a military building, which was with more or less trouble and expense adapted to the purpose. Then the exhibition went for two years to the centrally located but wholly inadequate quarters of the Permanent Sale Exhibition in Georgen Strasse, under the viaduct of the City Elevated Railway, where it attracted little attention, except from experts, the builders of motor carriages, each of whom showed his latest and best work and studied carefully all improvements exhibited by his neighbors. The exposition of last year showed many promising indications that have this year matured into actual results, which the public has been quick to recognize and appreciate.

This exposition, like those preceding, has been the joint enterprise of the Union of German Motor Car Builders and the German Automobile Association, a national organization made up of seventeen clubs located at Strasburg, Bielefeld, Munich, Coblenz, Dresden, Frankfort, Nuremberg, Halle, Hanover, Cologne, Leipsic, Eisenach, Mannheim, Breslau, Aix-la-Chapelle and two clubs at Berlin. These include among their members substantially all Germans who are interested in automobilism for purposes of sport and recreation. The Union of German Motor Carriage Builders includes principally the Daimler Company, of Cannstatt and Marienfelde; Benz & Co., of Mannheim; the Dürkopp Company of Bielefeld; Adam Opel, of Russelsheim; the Adler Company, of Frankfort; the Cudell Company, of Aix-la-Chapelle; De Dietrich & Co., of Niederbronn; Weiss & Co., of Berlin; the Bergmann Company, of Gaggenau; and a dozen others, besides a large number of makers of pneumatic and other tires, wheels, igniters, and all the elaborate and varied details of motor vehicle construction.

The exhibitors numbered this year 115, and are practically all German, the limited space at command of the committee, as well as other economic conditions, having rendered impracticable an international display. Two American machines, the Oldsmobile and the Locomobile, were exhibited by the German firms at Hamburg and Berlin, respectively, which have within the past three months taken over the general agency for these vehicles in Germany. In the same way the French Dion-Bouton carriages were exhibited by the Berlin agents; but with these exceptions the exhibition was distinctively German, and as such gave an exact key to the present status of the industry in that country.

During the past year the Emperor and the whole military department of the Government have become greatly interested in motor vehicles for army purposes. Prince Henry of Prussia has become a devoted automobilist; he has made a memorable tour across the country in an American locomobile, and personally opened the exposition as the representative of the Emperor, who was absent from the city, but came a day or two afterward and spent several hours examining critically every notable feature of the display. Moreover, the weather throughout the whole fortnight of the exposition was favorable, and the location, which it was feared would prove too remote for popular success, turned out to be a decisive advantage.

The exhibition is located in the Flora, a large suburban music garden restaurant in Charlottenburg, 3 miles westward from the Brandenburg gate, and approached by a broad, asphalt paved boulevard, which formed an ideal testing course for the throng of visiting automobilists who had assembled at the opening of the show to the number of 300, representing every automobile club in Germany, and took part in a brilliant illuminated parade, which, on the night of March 8, came in through the Thiergarten, along the Linden, and was reviewed before the imperial castle. Nothing like this had ever been seen in Berlin before, and thenceforward the automobile, as an institution, seemed to take on a new dignity and character. The limit of speed within city limits is fixed by regulations at 12 kilometres (7.3 miles) an hour, but during the past fortnight motor carriages of all types and dimensions, bearing the labels of clubs belonging to the national association, have whizzed along the boulevard, between the Brandenburg gate and the Flora, at double or treble the prescribed pace, and the police, for once in their lives, have closed their eyes.

The distinctive feature of the exposition of this year was the uniformity with which the latest and best work of all the great German builders conforms to two or three standard types. Last year, and especially two years ago, there were several conspicuous novelties, as, for instance, the combination gasoline and electric motor carriages, with which ambitious inventors were seeking to create wholly new types and find success by original and untrodden paths. Motors were of many kinds; some were carried forward, some behind, others under the centre of the vehicle. There was a nearly even number of electric and gasoline motors, with steam as a promising third in the race. This year nine-tenths of all the vehicles exhibited had hydrocarbon motors, and, excepting the two American

ges of the runabout class, the whole [...]y conformed closely to established [...]. With scarcely an exception, the [...]les, whether tonneau, phæton, victo-[...]oupé or break, all carry the motor in [...] high above the axle, and covered [...]a movable shield, which protects the [...]ing parts while rendering them in-[...]y accessible for observation or re-[...] The success of the Daimler Merce-[...]as fixed the form and general princi-[...]of construction, not only for racing [...]ines but for all the larger classes of [...]ng and pleasure automobiles in Ger-[...].

[...]ong the novelties in details were sev-[...]kinds of rubber tires with steel shoes [...]les for the purpose of preventing [...] on rough, and slipping on smooth, [...], and there were several improve-[...]s in igniters for gasoline motors, [...] attracted the earnest attention of ex-[...].

[...]e German automobile industry started [...] the advantage of a leading position [...]l that relates to hydrocarbon motors [...] Otto, Daimler and Benz are all Ger-[...] names—and besides this there were [...]al bicycle firms with large plants and [...] of trained workmen ready to embark [...]ptly and effectively in the new branch [...]anufacture. It has now reached a [...] at which it supplies not only most of [...]ome demand but produces a surplus [...]export, and several of the German [...]rs have already an important market [...]reat Britain, Belgium, Russia and [...]ria-Hungary. One of the topics dis-[...]d at the recent exposition was the or-[...]ation of a cartel or syndicate among [...]eading manufacturers to promote and [...]onize their interests in respect to for-[...] trade, and it is probable that a repre-[...]tive display will be made by them [...] year at St. Louis.

N. A. A. M. Matters.

[...]r the benefit of members who have [...]ed for space in the automobile depart-[...] at the Louisiana Purchase Exposi-[...] the association is arranging for the [...]ing of an automobile stable, in which [...]les to be used for demonstration pur-[...]s may be stored.

[...]e Exposition officials have agreed to [...] an exception in the case of automo-[...], by allowing them to be operated on [...]ck at the Exposition, and, by means [...]ecial permits, to be taken in and out [...]e grounds, privileges which are not [...]ted to any other class of exhibitors.

[...]e Athletic Stadium, which is suitably [...]ed and very large, may be used for [...]ing automobiles in motion at any time [...] no athletic events are in progress. [...]lose proximity to the Stadium and also [...]e entrance of the grounds there will [...]rovided a location for an automobile [...]e for the housing and caring of ma-[...]es which it is desired to show in mo-

It is estimated that the space in the regular exhibit department for the accommodation of automobiles will cost approximately $200,000, not including all the other expenses of managing and operating the department. A simple and yet appropriate design will be made, and the expense assessed among the exhibitors on the basis of the number of square feet used by each. Foreign exhibitors will also be permitted to use the stable on the same basis as the American automobile manufacturers, and the chief of the department has requested the commissioners of France and Germany to advise him how much space will be required by them. The secretary expects to learn in a short time the number of automobiles which the American manufacturers will have at St. Louis for demonstration and how much space will be required by them in the stable. This information is necessary before designs and estimates can be made by the Department of Works at the Exposition. The building will have a cement floor and will be thoroughly protected against fire, but the care of the vehicles must be attended to by the individual owners. There will be all the necessary facilities, such as water supply, drainage, electric lighting, current for recharging batteries of electric machines, lockers for caretakers, chauffeurs and supply of gasoline.

A. C. A. Affairs.

Members had a run to Ardsley, N. Y., on April 18, going through Bronx Park, New Rochelle, Mamaroneck, White Plains and Tarrytown.

New York Automobile Trade Association.

The manufacturers and their representatives of New York city on Thursday night last effected an organization known as the New York Automobile Trade Association. Twenty-two concerns were enrolled as members. George B. Adams, of the International Motor Car Company, acted as temporary chairman. A constitution and bylaws were adopted, and some time was spent in the discussion of the general objects of the association. It was suggested that efforts be made to concentrate the trade in the vicinity of Seventieth street and Central Park, but no definite action was taken.

An executive committee of fifteen was appointed with the following members: Electric Vehicle Company, Pardee & Co., Mobile Company of America, Winton Motor Carriage Company, Locomobile Company, United States Long Distance Auto Company, John Wanamaker, Homan & Schultz, Smith & Mabley, Barry & Hayes, Studebaker Brothers, Central Automobile Company, A. G. Spalding & Brother, Oldsmobile Company and the International Motor Car Company.

J. F. Plummer, of the Locomobile Company, was elected temporary secretary. The executive committee will hold a meeting on Friday night next at 1715 Broadway and elect a president, two vice presidents, a secretary and treasurer.

There are two classes of membership, active and associate. The active are manufacturers of automobiles and representatives, while the associate are makers of parts.

Club Notes.

A number of the business men of Buffalo, N. Y., have interested themselves in the formation of an enterprise for the storage and care of electric vehicles, and have incorporated under the name of the Electric Automobile Club. The articles of incorporation state the purposes of the club to be "the delivery of automobiles from a central station, where they will be kept charged and stored, to the residences of private owners of such automobiles; the repairing of electric carriages, and to keep and maintain electric carriages for hire, etc." The directors are Van Loan Whitehead, Lauren W. Pettebone, Edward J. Meyer, William Y. Warren, Samuel J. Dark, Joseph P. Fell and Frederick B. Robins.

Before going ahead with the arrangements for holding a public meeting of automobilists with a view to merging the present New Jersey Automobile Club of Newark or forming a separate organization, those interested are waiting to see what attitude the club will take. If that body invites the automobilists to join them in strengthening their organization, an affiliation will probably be effected; otherwise, it is said, a separate club will be formed. There are about 200 owners of horseless vehicles who have expressed interest in the movement. Besides Dr. H. C. Harris, of Glen Ridge, who heads the movement, Dr. James H. English, Jacob Mason, Lewis J. Wyckoff, George Paddock and John H. Long are working to interest automobilists.

The officers of the new Florida East Coast Automobile Association, Daytona, are as follows: President, Dr. H. H. Seelye; vice presidents, W. H. Peters, John Anderson; secretary, John B. Parkinson; treasurer, S. H. Gove; executive committee, J. A. Hendricks, chairman; C. R. Oliver, E. G. Harris, J. F. Hathaway, W. J. Morgan, R. E. Olds, J. P. Beckwith, C. B. Ryan, Capt. C. A. Young, Louis Adler, J. D. Price, Frank X. Mudd and Alex. Winton. The initiation fee has been fixed at $10 and dues $10 per year.

On the evening of the 16th inst. the Long Island Automobile Club celebrated the opening of its new home, which is located at No. 32 Hanson place, Brooklyn. A reception in honor of the lady friends of the club was held in the parlor on the upper floor of the building, which is well adapted to a function of this kind. An amateur band of four pieces played various popular airs and dance music, to which most of the

younger members present responded. Refreshments were served during the evening, and every piece rendered by the quartet elicited applause.

Members of the New York Motor Cycle Club participated in a run to Port Chester on April 19.

MINOR MENTION

Four "autocars" were used by the highway commissioners for inspecting the roads of Marion, Pa., recently.

The Western Motor Company, Logansport, Ind., is reported to have decreased its capital stock $150,000 and issued $150,000 preferred.

Britner & Co., Santa Barbara, Cal., will put in a plant to charge electric automobiles, and will also carry on a general automobile business.

Dr. Conley and Carl Tellefsen, of Ishpeming, Mich., are said to be planning a trip to Europe to look over the foreign makes of automobiles.

The third annual convention of the National Electrical Contractors' Association will be held at the Light Guard Armory, Detroit, Mich., on July 14, 15 and 16.

A reader inquires who makes a small oscillating magneto for bicycle use. We shall be glad to forward address of manufacturers of such machines that may be furnished us.

Edward Bertault, manager of the Paris office of the Consolidated Rubber Tire Company, of New York, has resigned, and will take the European agency for some automobile company.

The Cadillac Automobile Company, Detroit, Mich., will soon be located in their new buildings, having a floor space of 150,000 square feet. They expect to turn out 3,000 cars by October 1.

The Pence Automobile Company, 315 South Third street, Minneapolis, and Joy Brothers, Fourth and Wabasha streets, St. Paul, have been appointed agents for the Packard Motor Car Company.

The acting inspector of Washington, D. C., has recommended that no permit be granted to the Automobile Storage and Repair Company to remove a gasoline tank from Stanton court to Green court.

The first automobile for carrying passengers to the World's Fair grounds has arrived at St. Louis from Harvey, Ill., in charge of General Manager J. A. Linville, of the Chicago Motor Vehicle Company.

The new mill of the Federal Manufacturing Company at Elyria, Ohio, is now in operation. It covers five acres and is equipped for rolling cold steel; but the company intends to erect another building 300x80 feet for rolling hot steel from 2 inches up to 16 inches in width and in gauge from 16 inches to three-eighths inch. The equipment of the entire plant has been the special study of David L. Marwick, manager.

F. E. Edwards is negotiating with the local board of trade to locate an automobile factory at Medina, Ohio, the citizens to invest $100,000 in stock and furnish a site.

George E. Delong, formerly with the J. S. Leggett Manufacturing Company, Syracuse, N. Y., is organizing the Syracuse Automobile and Motor Company, which it is said will soon be incorporated with a capital of $100,000.

A large extension to the plant of the Olds Motor Works, of Detroit, Mich., is being planned. One building will be for a machine shop and will be 500 feet long and 150 feet wide. The foundry will be added to by an extension 70x200 feet.

A preparation for removing grease from the hands, which have become soiled through repairing an automobile, has been placed upon the market under the name of "Gre-Solvent" by the Utility Company, 233 Greenwich street, New York.

The mechanical engineering department of the University of Illinois is conducting a series of tests upon an automobile furnished by the Packard Motor Car Company. From these tests the mechanical and commercial efficiency of the car will be determined.

On April 16 John Brisben Walker, of the Mobile Rapid Transit Company, presented to the Rapid Transit Commissioners of New York his scheme to have the city appropriate about $10,000,000 for establishing an automobile omnibus service to comprise 5,000 machines.

Notices under date of April 14 have been mailed by the Automobile Club of Syracuse to all the automobile clubs in New York requesting that one or more delegates be sent to a convention to be held at the Yates Hotel, Syracuse, on April 25, for the purpose of forming a State organization.

Geo. H. Day has resigned the presidency of the Electric Vehicle Company, of Hartford, Conn., to become general manager of the Association of Licensed Automobile Manufacturers. Ex-Governor M. G. Bulkeley, of Hartford, vice president of the Electric Vehicle Company, has been elected to succeed Mr. Day.

The Woodruff Automobile Co., Akron, Ohio, it is said, will be reorganized and will increase its capital stock from $50,000 to $500,000. It has been learned that the scheme contemplates the purchase of the old J. F. Seiberling plant when $100,000 is subscribed and paid in. William W. Lindsay, of Detroit, is soliciting stock. A. M. Woodruff will be made general superintendent.

The Metropolitan Motor Car Company, New York, is now marketing the following sizes of the Stevens "indurated fabric tire": 3, 4, 5, 6, 7 and 8 inches, for wheels of commercial vehicles ranging between 32 and 48 inches in diameter. It is claimed that these tires will not chip and that they will wear evenly all around, also that they will give good traction on asphalt. Rolled steel flanges, instead of cast flanges of bronze, are now furnished with them.

An automobile omnibus and dray line is in the process of formation in St. Louis, and within a year the company will have between 500 and 1,000 omnibuses and 1,000 and 1,500 heavy drays running.

American Team for Gordon Bennett Cup Race.

Alexander Winton, Percy Owen and Louis P. Mooers will carry America's colors in the Gordon Bennett Cup race in Ireland on July 2. The two latter were selected on Monday by the committee of the Automobile Club of America. They met the committee and about 300 spectators at Garden City, L. I., and both went over a 6 mile course to show what they could do. Owen covered the first 5 miles in 5 minutes and 25 seconds. On a second trial he did 6 miles in 7 minutes and 22 2-5 seconds. He then did a mile in 1:02 and another in 1:04. His Winton ran very smoothly, and he showed a masterly control.

Mr. Mooers' test was not a success owing to derangement of the machinery of his 40 horse power car through the carelessness of one of his workmen. Harry Harkness did not show up, as he met with an accident on the way, putting his car temporarily out of commission. No plans have been made to give him another trial, but it is thought that he will go as a substitute.

Messrs. Winton and Owen will sail for Europe on May 30.

Association of Licensed Automobile Manufacturers.

The executive committee of the Association of Licensed Automobile Manufacturers held an important meeting at the Hotel Manhattan, New York, last Thursday, and perfected the organization, but would make public none of the details. Geo. H. Day, manager, stated however, that the applications of three manufacturers were favorably acted upon, and that licenses would be granted them. The names of these new members were refused. The names of other applicants will be taken up at a meeting to be held in the near future. The settlement of the suit against Smith & Mabley, of New York, was approved. There were in all eighteen applications before the committee, and many more inquiries that were left unanswered until another meeting can be held.

The matter of forming a plan whereby the agents and the association will act in harmony was taken up, and it was decided that as far as possible no agent will be allowed to sell the machines of members of the association and of non-members.

The association will move its headquarters from 100 Broadway to 7 East Forty-second street.

LEGISLATIVE AND LEGAL.

sed Regulations in the District of Columbia.

first draft of regulations to govern obiles in the District of Columbia esented at a hearing before the commissioners on April 14. It provides that ctive chauffeurs must pass an examination before a Board of Examiners of Engineers of the District, who shall to the commissioners all competent ject all incompetent persons, until shall have acquired the necessary edge. Licenses must be numbered. cense numbers consist of separate numerals, each not less than three high and three-eighths of an inch and be conspicuously placed upon ar of the automobile, which shall be ed with two suitable lamps, one on ide, the style to be approved by the issioners, and the lamps to have the outside middle a metal band not an 2 inches in width, and into which be cut the license number, not less ½ inches high and in a style to be ved by the commissioners, the lamps kept brightly burning from one-half fter sunset as long as the machine is at night. Each automobile must be led with a device to lock the starting lever. Violations, or operating an automobile in a reckless manner, or while chauffeur is intoxicated, or knowingly ng anyone not having a license to e a machine, or permitting a machine main unattended in a public place, or ut the lever having been first locked, fusing to exhibit a license to any officer or member of the Board of iners is made sufficient cause for susng or revoking a license. Convicfor violations are punishable by a fine less than $5, nor more than $40, or sonment for not more than ten days, both fine and imprisonment.

hearing was attended by members National Capital Automobile Club thers. Erskine Sunderland, secretary club, said the members did not opall regulations, but that it feels the nt law is sufficient. He said he did ant numbers on lamps, saw no need ocks being placed on the starting and objected to the revocation of es after conviction. He thought a ufficient punishment.

also objected to the numbering of es, and claimed an officer would see icle going at what he might call unl speed, and would take the number wear out a warrant. He wanted to how the officer would substantiate his nent. He thought the speed limits high enough, but admitted that many operators ran their machines above that limit. He said that the automobilists themselves would like to see that class punished.

Dr. E. M. Hasbrouck said the commissioners were wise in many of the proposed regulations, but he objected to the numbering, to the provisions making it compulsory to show a license to policemen and to placing numbers on headlights. Other objections were made by C. Francis Jenkins, J. P. Lockwood, R. B. Caverly, W. J. Foss and Dr. W. B. French. Rev. J. A. Aspinwall suggested that small lamps be placed upon the rear of the machines to throw light upon the painted number. D. W. Baker, a lawyer, expressed the opinion that the commissioners would have no authority to revoke a license and thus deprive a man of the use of personal property.

Chief of Police Sylvester said the regulations should be adopted, as the police then would be supplied with a list of licensed vehicles, and could tell at a glance whether the machine and its owner were authorized to use the street.

Smith & Mabley Acknowledge Selden Patent.

The suit brought against Smith & Mabley, importers, of New York city, by the Electric Vehicle Company for the infringement of the Selden patent, has been settled out of court, and the former concern has been granted a license by the Association of Licensed Automobile Manufacturers. The suit had aroused unusual interest in the trade, because it was expected to prove beyond the shadow of a doubt just what rights the association had under the Selden patent. Defendants acknowledged judgment. The importance of this settlement will be appreciated when it is understood that Smith & Mabley are the first of the importers to join the association. The action of Smith & Mabley carries with it the acknowledgment of the Charron, Girardot & Voigt Company, which they control in America.

Charges Growing Out of the Locomobile-Overman Merger.

The Warren-Burnham Company has begun suit in the Supreme Court of New York against the Locomobile Company of America for $180,000, on the ground that in a transaction merging the Overman Automobile Company with the latter false statements were made by President A. L. Barber, of the Locomobile Company, on the value and liabilities of that concern. The Warren-Burnham Company state that they paid $100,000 for an interest in the Locomobile Company and then discovered that false representations were made throughout the negotiations. Because of operations with A. A. Overman the Locomobile Company was regarded as subrogated to the Overman Automobile Company, and it was agreed that that concern be made a party to the merger. The papers say that Mr. Barber claimed that the Locomobile Company was paying 7 per cent. on its preferred stock and that it had cleared in eighteen months $225,000, and that in August, 1901, the amount of the preferred stock sold was $864,089.79; that it owned the Whitney patents, which cost $303,548.32, and had assets in bills receivable amounting to $102,102.36.

The proceedings are now stayed for the present by a motion to require the Warren-Burnham Company to give security for costs, as it is a foreign corporation.

W. W. Niles, counsel for the Locomobile Company, refused to make any statement.

By a vote of 29 to 13 the New York Senate on April 17 passed the Bailey automobile bill.

Reginald Vanderbilt was fined $12.80 on April 13 for speeding his automobile in Middletown, R. I.

The trustees of Alva, Okla. Ter., have decided to tax automobiles at 50 cents on the dollar of the first cost.

The Holmes automobile bill has been advanced to a third reading in the Michigan House of Representatives.

The ordinance regulating the running of automobiles in Pittsburg, Pa., has been referred to the city solicitor, as there is a question of its legality in its present form.

An ordinance has been adopted by Crawfordsville, Ind., which limits the speed of automobiles to 6 miles an hour and provides a fine of not less than $10 nor more than $100 for violations.

A resolution has been introduced in the Augusta, Ga., council directing the police committee of that body and the city attorney to draft a suitable ordinance regulating the speed and use of automobiles.

Edward Mulliken will soon be placed on trial at Edgartown, Mass., for having caused the death of A. B. Scott, whose horse, frightened by defendant's automobile, ran away and threw him out of his wagon.

R. H. Johnson, of Wayne, Pa., is being sued by the Quaker City Automobile Company for the purchase price of an automobile, for which he declined to pay upon the ground that the machinery is defective.

It is reported that since the rigid enforcement at North Hempstead, L. I., of the speed law and numerous fines imposed for violations, the automobilists are favoring the south side of the island, because there is less danger of arrest.

License Commissioner Clifford, of St. Louis, Mo., recently had circulars distributed throughout the city calling upon automobilists to take out a license, notifying them that it was due on January 1 and that they were liable to a fine for the neglect.

Attorney General McCarter, of New Jersey, is the first victim of the new automobile law, for the passage of which he was an advocate. He was arrested at

Madison, N. J., for exceeding the speed limit and fined $27.60. He at first protested, but finally paid.

At a recent meeting of the city council of Atlantic City, N. J., an ordinance to legalize and safeguard the use of gasoline for automobiles was considered.

Six bicycle policemen have been detailed to patrol Fifth avenue, between Fourteenth street and the Harlem River, New York, and arrest all automobilists who exceed the speed limit. Policemen in plain clothes have been detailed to enforce the law in various parts of the city, and numerous arrests have resulted.

Automobiles will be required to bear prominently license numbers at least 5 inches high and contrasting with the color of the machine, according to an ordinance adopted by the South Park Board, Chicago, Ill. Violations are punishable by a fine not to exceed $100. The ordinance is to take effect on June 1.

The West End Association, New York, is making a vigorous stand against violations of the law by automobilists, and the police of the West 100th, West 125th, West 152d and East 126th Street Police Stations have declared war on everybody who speeds at a rate in excess of the limit fixed by law. The result was the arrest of many automobilists on Sunday.

A. C. Banker, a member of the Chicago Automobile Club, is understood to have stated to the police that when a man accompanied by a lady breaks the automobile ordinance he is exempt from punishment, and that under such conditions he will not stop. The superintendent of parks has brought the matter to the attention of the club, and the executive committee have called upon Mr. Banker to explain his peculiar interpretation of the law.

New Incorporations.

Brooklyn Automobile Company, Brooklyn, N. Y.; capital, $25,000; directors, L. A. Hopkins, S. H. Hunt and L. R. Adams, all of Brooklyn.

South Broad Street Automobile Company, of Philadelphia, Pa., composed of Robert C. H. Brock, Dr. Wharton Sinklin and their families, to store and repair automobiles and furnish gasoline and other materials for their own machines.

Electric Automobile Club, to carry on an automobile stable; capital, $500; incorporators, Lauren W. Pettebone, Samuel J. Dark and Van Loan Whitehead, all of Buffalo, N. Y.

Hopkins County Automobile Club, Louisville, Ky.; capital, $1,000; incorporators, John T. Alexander, Charles Lindsay, Claude A. Morton, William C. Hollinger, Walter J. Dulin, Edwin G. McLeod, C. B. Long and Maurice K. Gordon.

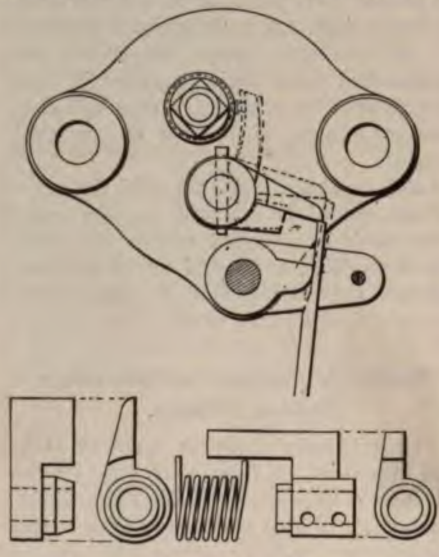
The Union Motor Company, of Portage, Ohio, to make gasoline engines; capital stock, $155,000; incorporators, Charles B. Rush, Howard C. March, Samuel R. Light, Charles M. Caldwell, Alva Shroyer, *Mason* Pultz and Alvin Marcks.

MOTOR VEHICLE PATENTS..

United States Patents.

724,649. Sparking Mechanism for Engines.—A. M. Zimmerman, of New Holland, Pa. April 7, 1903. Filed July 26, 1902.

A hammer break igniter of very simple construction. Both the stationary and

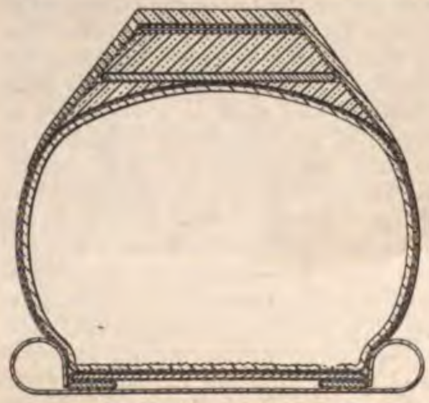


No. 724,649.

movable terminals are mounted on the same plug. At the outer end of the shaft of the movable terminal there are two radially extending arms, one of which is pinned to the shaft and one free upon it. A coiled spring is interposed between the two arms. The loose arm constitutes a trip arm, with which engages a trip rod operated by the crank shaft of the engine. The trip rod is provided with a beveled shoulder moving on a trip bar guide and causing the movable electrode to be tripped at the proper moment. The trip bar guide is pivotally supported and admits of varying the time of ignition.

724,830. Pneumatic Tire.—Wilbraham Edmunds, of London, England. April 7, 1903. Filed January 21, 1902.

This method of forming treads for a



No. 724,830.

pneumatic tire consists in wrapping a band of cotton, spread with india rubber solution, around a cylindrical support, fixing transversely around the band strips of india rubber so prepared that on being vulcanized they will become alternately hard and soft, then winding one or more layers of strong thread covered with india rubber solution around the layer of strips, covering the layers of thread with another layer composed of india rubber in the form of strips adapted to form alternately arranged soft and hard strips, cutting rings of suitable section from the built up material, attaching a strip of soft rubber of plano-concave section around the inside of each ring, and vulcanizing the compound rings thus formed.

724,449. Variable Speed Gear.—William N. Dumaresq. London, England. April 14, 1903. Filed August 2, 1902.

724,450. Variable Speed Gear.—William N. Dumaresq. London, England. April 14, 1903. Filed August 2, 1902.

724,531. Motor Tractor for Agricultural Purposes.—Daniel Albone, Biggleswade, England. April 14, 1903. Filed September 12, 1902.

724,681. Rubber Vehicle Tire.—George B. Dryden, Chicago, Ill. April 14, 1903. Filed January 14, 1901.

724,693. Wheel Tire.—Robert S. Graham, New York, N. Y. April 14, 1903. Filed September 30, 1902.

724,698. Piston Rod Packing.—George A. Harder and Joseph La Riviere, Greenriver, Wyo. April 14, 1903. Filed September 27, 1902.

724,749. Friction Clutch.—Alfred Soderling, Chicago, Ill. April 14, 1903. Filed August 2, 1902.

724,767. Motor Vehicle Controlling Device.—William O. Worth, Chicago, Ill. April 14, 1903. Filed May 10, 1902.

724,945. Ignition Plug for Explosive Engines.—William Roche, Jersey City, N. J. April 14, 1903. Filed August 16, 1902.

722,458. Speed Changing and Reversing Mechanism.—A. C. Sargent, of Graniteville, Mass. March 10, 1903. Filed November 21, 1902.

723,295. Power Transmitter.—Eddy T. McKaig, Chicago, Ill. March 24, 1903. Filed November 26, 1902.

723,299. Armor for Pneumatic Tires.—Harry Parsons, London, England. March 24, 1903. Filed December 17, 1902.

723,326. Armored Element for Electric Batteries.—Elmer A. Sperry, Cleveland, Ohio. March 24, 1903. Filed May 25, 1901.

723,451. Storage Battery.—Justus B. Entz, Philadelphia, Pa. March 24, 1903. Filed August 28, 1900.

720,995. Cooling Device for Explosive Engines.—Charles A. Bailey, Cromwell, Conn. February 17, 1903. Filed October 13, 1902.

721,413. Motor Car.—Herbert Austin, of Erdington, near Birmingham, England. February 24, 1903. Filed April 23, 1902.

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Reduction of Subscription Price.

We believe the time has come when a technical publication like The Horseless Age will find a wider field of usefulness at a more popular price, and we have accordingly reduced the domestic subscription price from $3.00 to $2.00 a year. Dating from Janu-ry 1, 1903, subscribers at the old rate will receive a rebate in the form of an extension of their subscriptions—six months for yearly subscribers and three months for six months subscribers.

The Licensed Manufacturers' Association.

By far the most important topic in automobile circles during the past fortnight has been the recent organization of the Association of Licensed Automobile Manufacturers and its probable effect on the industry, although the discussion has been conducted quietly and nothing further has appeared in the public press since the announcement of the organization. In this conection a number of our correspondents again raise the question of the validity of the Selden patent. As this question can only be decided by the United States courts, any outside opinion would be of little value. None are more interested in this matter than the manufacturers who have joined the organization, and the very fact of their having taken license under the patent indicates that they regard it as pretty strongly intrenched, for they would hardly be expected to pay royalty on a patent which had absolutely no chance of being upheld by the courts.

The fear, expressed in some quarters, that the patent pool will retard progress and improvement in automobile construction is scarcely well founded. If it were the intention of the association to throttle progress, it is true that with the Selden patent at command they could probably do so; but as they would certainly fail to profit by such a policy it is unreasonable to expect its adoption. The business of the members of the association, according to official authority, will remain entirely independent, the different members competing with each other the same as if no pool had been organized. An improvement made by any manufacturer will be of as much value to him as if no pool existed, for either his cars alone will be provided with this improvement or he will be paid royalty by the other members of the pool who make use of it. The same applies to any improvement made by someone not connected with a firm in the pool, the rights for which are acquired by one of the members. Hence there should always be an open market for practical improvements. On the other hand, parties who have really valuable inventions, we are assured, will be admitted to membership, and thus enjoy the same privileges as all other members.

Automania in a New Light.

The conviction is gaining ground among scientific men that indulgence in extraordinary speeds of transition voluntarily controlled breeds in the human species a form of disease capable of development to the degree of delirium. The disease is generally referred to as the speed craze or speed mania. By a rather strange coincidence a discussion of this subject took place at the *Societie d'Hypnologie et de Psychologie*, in Paris, only a few days before the tragic death of Zborowski. One of the speakers, a Dr. Hachet-Souplet, maintained that persons in position to increase their speed of transition at will are simply carried away by the consciousness thereof. They have no longer control of themselves, they are intoxicated. They then develop characteristics which are foreign to them when in the normal state: boastfulness, combativeness, crabbedness, hatred, mischievousness and violence. These characteristics vary in form and degree, but may attain a maximum in the cyclist and automobilist.

According to Dr. Bérillon, there is a strong analogy between the delirious intoxication of speed and that of morphine.

Those who indulge in abnormal speed simply for its own sake and without any useful object in view are mostly degenerates, devoid of all self restraint and having absolutely no control over themselves. They may sometimes be seen to dash furiously against even the most insignificant obstacles. Examples are on record where furious speeding has brought automobilists into the most serious difficulties, and yet, after a short interval, they would again indulge their passion. For instance, the French automobilist who ran over a customs official and was compelled to pay a heavy indemnity to the family of the latter, while abstaining from excessive speed for a while, soon had a relapse and sped his machine as recklessly as before. The speed habit resembles the alcohol and morphine habits, in that it develops by degrees, and that in the last stages the victim indulges it with complete abandon.

So far the conclusions of the psychologists. Their generalizations may seem rather too sweeping, but a number of extreme cases of auto mania during the last few years afford considerable substantiation for their arguments.

National Congress of Automobilists Proposed in the Interest of Just and Uniform Legislation.

Automobile legislation recently has taken a decidedly unfavorable turn in a number of States. In some cases it has even been intimated that the sponsors of the oppressive measures were moved by expectation of boodle. Although automobile interests are generally represented when such legislation is proposed, and although, as a rule, some concessions are obtained from the lawmakers, up to the present these interests have not been well enough organized to stem adverse legislation, nor has there been a definite understanding between automobilists as to what constitutes just and reasonable legislation and what unjust and objectionable. There are, of course, in every body of automobilists some who deny the need of any legislation whatever, but they are far in the minority. The great body of automobilists in this country at present do not object to reasonable speed restrictions, identification signs and other regulations which tend to increase the safety of travel on the public highway, and it is to be presumed that some sound basis for automobile legislation, certain definite principles, could be agreed upon by all the clubs and associations, to the support of which in their respective States they would pledge themselves, as well as to the opposition of any measure denying automobilists the rights to which the congress believed them entitled.

A sort of standard automobile law might be worked out which would bear the prestige of the backing of the whole automobile movement in the country, and certainly no better means could be devised for securing uniform legislation in the different States.

With a view of initiating such a movement, we propose that a legislative and legal congress be held some time during the coming summer or fall, to be attended by delegates from all the various automobile organizations in the country. The congress should preferably be held in some city like Buffalo, near the centre of gravity of automobiledom in the United States.

A considerable number of State legislatures have occupied themselves with automobile legislation during the sessional period now closing, and the indications are that the subject will be taken up with renewed activity next winter. Therefore, by holding a congress next fall and elaborating a sort of model law or a set of principles to be fought for, the automobile clubs would be prepared to meet any attempts at unfair legislation during the coming sessions. If possible, the congress might be held at the conclusion of some important automobile competition which may be held next fall.

As examples of points on which the congress might take action we mention: Rules to be observed by automobilists in meeting or passing drivers of horses or other domestic animals on the road, and rights of tourists. It is a useless and most objectionable rule which requires automobilists to slow down to an unreasonable pace when meeting horses, without regard to whether the animal shows signs of fright or not. Of course, when the animal shows signs of fright and an accident is threatened, the automobilist should slow down and even stop if the driver of the animal requests it by raising his hand. The right of a horse driver to require an automobilist to stop should, however, be limited to cases where the horse becomes restive, and there is actual danger of accident.

Identification signs should comprise, besides the number, the initials or other designation of the State in which the identification number was issued and the owner's name is registered, and this identification sign should suffice in any other State for a period not exceeding, say, ten days.

It is not to be expected that all legislative bodies would adopt the proposals of the congress outright and en bloc, but there is no question that the proposals would make for uniformity in automobile legislation and add strength to the efforts of those who are opposing unjust laws.

The Boston Hill Climbing Contest.

The climbing contest on the Commonwealth avenue hill in Boston last week showed once more that the general public is more interested in spectacular demonstrations than in really practical achievements. Contestants who took the incline at a fair pace, which is all that is needed in a practical vehicle, met with little applause from most of the sightseers, while the whole interest of the crowd seemed to centre in the sensational performance of the winner in the steam class, in scaling the 13 per cent. grade at the rate of over 40 miles an hour.

A vehicle which can develop a speed of over 40 miles an hour on such a grade ought to be good for over 60 miles an hour on the level (for an equal period), and seems therefore rather too fast for ordinary road use.

Steam again proved its superiority in hill climbing, particularly for hills of short length. The custom with drivers of steam cars in hill climbing contests is to adjust their safety valves to a much higher pressure than is usually carried, and to start with a water level in the boiler well above the average, so that the energy stored up in the hot water in the boiler greatly increases the speed that may be maintained for a short time.

It would rob hill climbing contests of some of their sensational features, but would add to their practical value, if the boiler pressure and water level were required to be normal at the start. On the other hand, if a full complement of passengers must be carried it would be as well to specify that all must exceed a certain weight, to prevent any contestant from gaining an unfair advantage over the rest by carrying small boys. This last requirement shows that the organizers intended to make the event one of practical interest and value, and it is our belief that to fully accomplish this object in future contests of this kind some further restriction as outlined above, should b[illegible]

l Steering and Power Control

protest of a correspondent in our sue against the use of wheel steering e usual American type of gasoline out, with hand control of clutches, es attention. The steering gear is edly the chief factor upon which de- the safety of the car, and fashion l therefore be the last thing to be lered in its design. It is not e concluded, *a priori* that be- wheel steering is always used in expensive cars, it is necessarily an vement in a light car. Wheel steer- omprising an irreversible mechanism ier expensive to construct, and when d to a low priced car it may not re- the careful workmanship that is sary to obtain a gear free from back- which is most essential to the com- f the driver and to the safety of the

ars in which the engine must be un- ed by hand, the driver can have only hand on the steering wheel in tight , and whichever way the steering may be constructed he can hardly as good control of the car with only hand on the wheel as with one hand ide lever or tiller. This probably ex- why some American manufacturers avier cars with hand operated clutches very slow to adopt wheel steering. ry light cars capable of moderate only, and the engine of which can clutched by hand only, lever steering l seem to have a positive advantage wheel steering. Yet it must be re- ered that these cars can practically s be controlled at any speed by the le and brake alone, both of which perated by the feet. If wheel steer- used, however, it should be kept as rom backlash as possible, and to this djustments for taking up wear are tial.

icipal Governments and Motor Wagons.

nsiderable encouragement has been the heavy motor industry in Euro- countries through orders from muni- governments. London has its motor sprinklers and dump wagons, and a er of other cities in the United dom are using motor wagons serv- alternately as street sprinklers and ge wagons. The city of Hanover, any, employs motor propelled fire es, and Paris is about to add to her motor fire engines and motor mail wagons motor propelled sprinklers and garbage wagons. The adoption of motor wagons by municipal authorities helps the motor wagon industry not only through the orders directly but by setting an example for business houses. Most firms are naturally somewhat skeptical as to the practicability of motor wagons for commercial transportation at the present time and are not easily induced to try the experiment. Owing to the great advantage to the community at large, from a sanitary standpoint, of the use of motor wagons over that of horse wagons, municipalities are deeply interested in the general application of motors in city transportation and owe it to themselves to give the movement every encouragement.

It is to be hoped that the forthcoming trial of commercial vehicles in New York will be properly called to the attention of the street cleaning departments of all the larger cities in this country, and that after the contest the latter may see their way to take the lead in placing orders for the most successful vehicles of the type suitable for their purpose.

Calendar of Automobile Dates and Events.

May 1.—Automobile Parade, New York, under auspices of A. C. A.
May 9 to 14—Belgian National Circuit.
May 10.—Motor Cycle Century Run.
May 13—14.—Non-Stop Run of the Scottish Auto Club, Glasgow to London.
May 14.—Start of Paris-Madrid Tourist Section.
May 20—21.—Commercial Vehicle Contest under the auspices of the Automobile Club of America.
May 24—26.—Paris-Madrid Race.
May 25—30.—Alcohol Motor Wagon Trials at Berlin.
May 30 — Massachusetts Automobile Club Race Meet.
June 18—20.—Paris Automobile Fetes.
June 18—28.—Aix les Bains Auto Events.
July 1—15.—Irish Fortnight.
July 2.—Gordon Bennett Cup Race.

A Review of the Ignition Question.

By Albert L. Clough.

THE CONTACT SPARK.

It has been of some interest to note the history of ignition methods in the development of the auto industry in this country. Most of the manufacturers who early perfected usable machines employed the contact spark obtained from quick breaking sparkers tripped by a mechanism actuated by the secondary shaft. Current was usually supplied by wet cells of the alkaline copper-oxide type.

This system was exceedingly simple when applied to one or two cylinders, and when well worked out gave very reliable ignition. The electrical apparatus (especially the coil) was of the most inexpensive character. No high voltage was employed and the "bell hanger's" wiring, which then prevailed in motor circles, sufficed fairly well under these easy conditions.

The system had its faults, however; dust or mud not infrequently fouled the moving parts of the sparkers and caused a sluggish break or a total failure of action. Contact points suited to withstand for any considerable time the high temperature of explosion and the hammering of the mechanism had not been developed, and the points in use composed of steel, silver, german silver or platinum required frequent inspection, smoothing up or renewal. The method of attaching the sparking mechanism to the cylinder head by means of a bolted flange with asbestos gasket was crude and made its removal a tedious matter.

The moving electrode, which must necessarily pass from outside into the compression space, was the cause of some loss of compression, and was very difficult to keep properly lubricated and "snappy" in action.

These contact sparkers generally embodied no device for change of spark position, and mechanisms to effect this end were developed somewhat tardily. Some objection was also made to the constant clicking of the tripping devices of these sparkers.

THE JUMP SPARK.

The motor industry abroad, busying itself with the development of a very high speed type of engine, naturally turned itself toward the working out of a jump spark method, as contact spark mechanisms are not readily applicable to motors of this type, with revolutions frequently exceeding 2,500 per minute. Any attempt to operate a touch spark igniter at such speeds would be likely to result in disappointment. The inertia of the moving parts, the rapid wear and the attendant noise would prove serious objections. Foreign progress in jump spark apparatus was quite rapid and exceedingly creditable. The system was worked out with care and success. One famous concern developed a contact device embodying the cam actuated spring trembler, capable of producing a multiplicity of sparks at the proper instant. It has been stated that in order to evade the patent upon the mechanical trembler the electrically operated coil trembler or vibrator was largely adopted. Whether this be true or not, the advent of the coil vibrator has injured the reputation of the jump spark system and the temper of many a chauffeur to no small extent.

With the first adoption in this country of French ideas, the jump spark sprang into favor and became of almost universal adoption. There were and still are a few American builders who never adopted the jump spark method, but clung to a form of contact ignition which had proved very reliable. It is only fair to say that the makers referred to produce as reliable rigs

as are built, and their conservatism would seem to be vindicated.

The jump spark apparatus first produced in this country was quite defective, and the manner in which it was installed was very much worse. There was very little originality shown and some of the copies were very bad. Anyone who participated in the New York-Rochester run will remember how bad the jump spark ignition was on some otherwise successful machines. Its use was very popular, however, owing to the ease with which spark lead could be controlled, the readiness with which the plugs could be removed for inspection and the absence of hot working parts liable to be fouled, or to lose their lubrication.

Nevertheless the new system proved and is still proving the source of a great deal of annoyance.

The spark plugs proved fragile electrically and mechanically. The insulation would frequently break down through the effect of heat causing unequal expansion and contraction or a dash of cold water from a puddle in the road would cause the heated porcelain to crack. The earlier plugs were so constructed as to be very prone to become coated with deposited carbon and to short circuit. Later designs have, however, done much to obviate this difficulty and improved carburation and lubrication as well, perhaps, as the invention of the auxiliary spark gap have lent assistance to the elimination of this difficulty.

SPARK PLUGS.

American spark plugs are almost uniformly of one-half inch pipe thread. The manufacturer whose ignition is remarkably successful employs a plug of considerably larger size—apparently about three-quarters of an inch. There may be others who have adopted a size larger than one-half inch. At any rate, it would seem that a larger measure of electrical and mechanical endurance could be obtained in a larger plug with larger insulating portions composed of a more durable material than that ordinarily employed.

THE CONTACT DEVICES,

or timers, which were supplied with the earlier American jump spark outfits were rather crude. When directly applied to the secondary shaft of a horizontal motor, the contact box was usually exceedingly inaccessible and in a position to be flooded with oil. The method of contact generally employed was that of the telegraph key, that is, a "dead" or non-rubbing contact, without the faculty of self cleaning. The moving or cam actuated contact was generally carried upon a tempered steel spring, which, if not of proper design, would not infrequently break. The contact points were often of an inferior quality of metal, electrically, and soon burned into a condition of non-conductivity. All parts of these contact boxes were too often constructed flimsily, and put together with tiny brass screws. Vibrators became almost universal upon the coils. The form of contact box alluded to above, while suited to the operation of a mechanical trembler, evidently impressed some manufacturers as not otherwise advantageous, as a number of makers adopted the trailing contact, evidently taking a leaf from the book of the dynamo constructors. The contact upon a collector or commutator is inherently self cleaning, and a device of this kind can be constructed which is much less delicate than any "hammer" contact mechanism.

THE COIL.

Apparently not a very large proportion of the trouble experienced with the jump spark system has originated in the coil itself. Some faulty insulation has doubtless given way, the fine secondary conductor has sometimes broken, and the winding of the secondary has occasionally broken away from its terminals. Condensers, too, will break down upon occasion.

Very few are likely to dissent from the statement that the coil trembler is the bête noir of the jump spark system. The principal defects which have appeared in its commercial forms are as follows: Difficult adjustment of its distance from the core and its tension on account of its being too short and too stiff, and for other reasons on some coils the margin of adjustment is so extremely small that the merest fraction of a turn of the adjusting screw will throw the vibrator from working into an inoperative condition; lack of positive means of locking the adjustments in an operative position or the likelihood of spoiling the adjustments when setting lock nuts; lack of contact points of proper material to insure long life, and infrequency of necessary adjustment under the existing mechanical and electrical conditions.

It is a rather significant fact that coils are put out by the best makers without instructions as to the battery power, either in voltage or current, which is required for their most profitable operation. Since the condenser can be proportioned to annul the primary spark only through a somewhat restricted range of battery power, it is not strange that we find vibrator points rapidly deteriorated by the vicious primary spark which occurs under unbalanced conditions. If the coil vibrator could be eliminated by the development of a contact device which would combine self cleaning contacts with an instantaneous and positive break or breaks, a great boon would be conferred upon the automobile industry. The attempts which have been made in this direction have not met with complete success, so far as is known.

Another point in regard to the jump spark system which is not without interest is the fact that with its advent came the almost universal adoption of the dry cell and the retirement of the very reliable wet battery. The French used dry cells, so we did, and some of them were bad enough, in all conscience. Considerable weight and space were saved and all kinds of trouble and uncertainty were incurred. It would not be surprising to see a reaction in favor of the wet cell when one of small size and unbreakable type is developed.

MECHANICAL SPARK GENERATORS,

both of the magneto and self excited types, had begun to meet with some popular favor in the days of the contact spark. Despite their general lack of positive driving mechanisms they worked so well with the contact spark that their future seemed assured. The jump spark movement has had a deterring influence upon the development of mechanical spark generators owing to the less flattering results which have usually attended their use with this system. Bad wiring in vehicles employing the jump spark method has been a most prolific cause of dissatisfaction. One would not think of constructing a high tension electric transmission line in the same manner that one would wire up a door bell, but there has been a total lack of similar consideration shown in the electrical connections of many a vehicle of otherwise good workmanship. The use of an inferior conductor, its too close proximity to conductive parts of the vehicle, and failure to support it upon porcelain and as much as possible out of the way of road damp and faulty connections, have been some of the common defects.

At the recent show there were some things noticed that might be construed as signs of a reaction in favor of the contact spark method. Ignition upon this system was noticed upon at least one four cylinder touring car of most distinguished make.

This particular fact seems peculiar, as it would seem that the contact spark system has its least advantageous field of application in multi-cylinder motors, owing to the multiplication of the points of complication. The ignition of a four cylinder engine by the jump spark method involves the use of a distributer as the only additional piece of apparatus over that required in a single cylinder outfit, while the multiplication of moving parts on a four cylinder contact spark outfit is considerable.

Whether there actually is a reaction setting in against the jump spark method cannot be foreseen, but it can hardly be doubted that both systems are capable of giving practically perfect results if worked out honestly and with ability. It would be somewhat surprising, perhaps, if the jump spark method did not prove itself possessed of the balance of advantages in multi-cylinder construction at least.

Motor fire engines and ambulances are already used by the Paris municipality. Now automobile sprinklers are to be employed in the streets. The Municipal Council has just given its assent to the idea and accepted the designs sent in by De Dion & Bouton. The building of the automobile sprinkler will commence at once, and the up to date vehicle will be ready to commence operations in the streets on the dust of this summer.

Boston Hill Climbing Contest.

By Albert L. Clough.

hill climbing contest of the Massa-s Automobile Club on Monday, April s a complete success in every respect. eather was ideally perfect, the crowd rge and enthusiastic, and the number propelled vehicles present was probe largest ever seen in New England. ict that all the vehicles, without ex-, climbed the hill successfully was sive to the onlookers and will do its oward increasing public confidence in biles.

contest took place on a course one- a mile in length on the north side of mmonwealth avenue hill. A distance eet ahead of the starting line was al-to get up speed in.

monwealth avenue hill, while a grade per cent., is perfectly kept and the urface is very favorable to easy climb-one who is familiar with real coun-ls the course chosen does not seem evere. Not only is the grade very less than that which is likely to be tered in almost any tour through the ortion of New England, but it is en-free from sand, stones, water bars llies, and to surmount this hill can be called a severe practical test upon le. In fact, it is hardly to be sup-that the managers considered this to case.

of the rules of the contest was that car should carry its full complef passengers, a rule which was evi-not obeyed by many of the con-, for in the majority of cases all the except that of the driver, were oc-by small boys. The start had orig-been scheduled for 3 p. m., but as there were about fifty entries the beginning of the event was advanced to 2 p. m.

Frank P. Durbin and F. E. Stanley in Their Winning Stanley.

A hill climbing contest among vehicles is really nothing more than a test of relative effective "ability"; that is, the relative ratio of effective power to weight of the competing cars, and of the fitness of the "gears" employed for the grade to be surmounted. The car having the highest effective "ability" and a gear just capable of slowing down the engine to its most effective speed, with full throttle and best spark position, under the particular road conditions, is likely to win. If a rig is heavy for its effective horse power it will at once have to resort to a very low gear and its speed will be low, and if it happen to possess one particular gear so high that the engine will slow down abnormally under the load imposed by the gradient, while the next lower gear fails to properly load the motor, it will probably fail of success. The gasoline cars are, of course, referred to in the above remarks.

In the case of the steam cars the storage of energy which they possess in their boilers

Before the Races—General View Near the Starting Point.

Group of Officers of Chronograph Club and Their Electrical Timing Device.

renders them capable of making magnificent records upon steep hills, if not of too great length. By judiciously bottling up steam before starting and making certain adjustments of the safety valve and burner most sensational results can be obtained in making short spurts with the assistance of the boiler reserve. Very few steam cars are capable of keeping up for a long distance the tremendous pace which may be temporarily realized upon a short hill.

A gasoline car which can attain a certain speed upon a hill of certain declivity can keep it up until its supplies are exhausted, and this statement is equally true of the electric vehicles.

In the Commonwealth Hill contest not very much transpired which was of technical interest. Mr. Dooley says "There's no news in being good," and the machines certainly behaved remarkably well. There was, however, no lack of interest, and matters were so well arranged by the committee that there were no vexatious delays.

There are a few points which may be worthy of note. Among the gasoline vehicles there was an almost total freedom from faulty ignition. Only one car was noticed in which the ignition was other than perfectly regular and it can hardly be doubted that not only has there been great improvement in sparking outfits, but that carburetors are better adapted than formerly for correct working upon steep grades.

It seems hardly proper to allow the relief of mufflers in a test of this sort; in fact, it is doubtful whether it should be permitted under any conditions of official surveillance. Mufflers were cut out in quite a number of cases.

One thing which was noted was the smoothness with which gears were changed, and it shows that a great advance has been made in this regard. Smoky exhausts were noticed in only a few cases. Naturally it is difficult to prevent too much cylinder lubrication in the rear cylinder of a horizontal opposed motor which carries oil in the crank case.

The possession of an intermediate speed is of the greatest advantage in a contest of this sort. In case a vehicle unprovided with a middle speed cannot negotiate the grade upon the high gear without unduly slowing the motor, it is forced to descend to its low gear and to let its engine operate

General View of the Races from Top of the Hill.

loaded. This was exemplified in the of a popular and widely used make of g car, with a two speed gear, which o climb the grade on its low gear. was another touring car of exactly ame rated horse power, but provided three speeds, which was able to make cent on the intermediate, with its en- to all appearances about correctly l. The machines of the former make ged about 30 per cent. longer in cov- the course than did the latter. This be attributed largely to the difference ars.

the grade had been considerably r it is quite possible that the former e might have won, as both would then been running on their low gears. s one is quite familiar with a vehicle

smoothness of the operation of their engines was excelled by none of the other contestants.

Considerable interest centred in the ascent of the little Orient buckboard, which is without any change gear device. Whatever doubts may have existed in the minds of some as to its hill climbing capabilities were dispelled when it successfully finished the course. In a vehicle without change gears some encouragement may be given the motor by a judicious slipping of the clutch in order to enable the motor to regain speed.

There was nothing sensational about the ascent of the electric vehicles, but, on the contrary, a steadiness of operation and lack of noise which were refreshing. The pace was very slow, but they covered the course with entire success. The smoothness of

GASOLINE, UNDER 2,000 POUNDS.

F. E. Randall, Stevens-Duryea	5	0	43 1-5
A. T. Harris, Duryea	8	0	45
J. R. Snow, Peerless	16	0	46
R. R. Ross, Packard	10	0	51 1-5
C. H. Robinson, Peerless	16	0	53 3-5
J. H. Ordway, Crest	5½	1	15 4-5
O. B. Cole, Duryea	8	1	40 3-5
L. J. Phelps, Phelps	8	1	08 2-5
H. H. Brown, Darracq	16	1	34
Gerard Bement, Peerless	16	1	20 3-5
G. G. Reed, Knox	8	1	04 1-5
A. R. Peabody, Oldsmobile	6	1	23
Wm. Jameson, Orient buckboard	—	1	24 2-5
A. Adams, Cadillac	6½	1	19 2-5

GASOLINE, OVER 2,000 POUNDS.

J. L. Snow, Peerless	16	0	43 2-5
C. H. Robinson, Peerless	16	0	51 2-5
Harry Fosdick, Winton	20	0	56 3-5
F. E. Townsend, Winton	20	1	06 3-5
John Williams, Winton	16	1	39
J. T. Robinson, Jr., Pope-Robinson	16	1	33 2-5
J. T. Robinson, Pope-Robinson	16	1	37 2-5

SHOWING THE GRADE FROM STARTING POINT.

ot always easy to determine by the d ear upon which gear a vehicle is ing.

re was very little throwing in and out tches and "nursing" of engines in or- overcome the grade—one vehicle only ing to have recourse to this ex- t.

motor bikes, which possess the high- bility of any self propelled vehicles, d the course at a terrific speed, but al event of the meet was the meteoric f the Stanley steamer, which cleared l at a 40 mile gait. It was a splendid of driving and won the hearty ap- of all present. The veteran designer vehicle was present and came in for are of congratulation.

Stevens-Duryea gasoline car made a d ascent upon the high gear, and the a, which has an established reputation ill climber, made a speedy climb with- course to its low gear. The Packard nox are known as good hill climbers ully sustained the good repute in they are held. The Peerless cars extremely creditable ascents, and the

operation of the gears was quite remarkable.

It would be interesting to know just how important a matter the personal equation really is in the times made by machines competing under such circumstances, but it is doubtless true that the handling of the throttle and spark and the determination of the exactly advantageous moment for shifting gears are matters of considerable moment—perhaps about as important as the differences of condition existing between machines of the same model. Among the machines of a certain make, which were rated exactly alike, the slowest consumed nearly 50 per cent. more time in making the ascent than did the swiftest. One would like to know the causes of so large a discrepancy—whether they are due to the operator or to the vehicle itself.

The following table gives the complete results:

STEAM VEHICLES.

Operator and Make.	Horse Power.	Time. M.	S.
F. Durbin Stanley	5½	0	17
J. H. MacAlman, Locomobile	5½	0	22 1-5
C. B. Grout, Grout	5½	0	25
H. E. Jay, White	10	0	31 3-5
C. I. Campbell, Mobile	6	0	33 2-5

GASOLINE WITH TONNEAU.

J. L. Snow, Peerless	16	0	51 4-5
Gerard Bement, Peerless	16	0	51 4-5
L. R. Spear, Winton	16	1	07 2-5
C. H. Robinson, Winton	16	1	07 2-5
F. E. Townsend, Winton	16	1	12 3-5
Leon Morrill, Winton	16	1	24 2-5
Harry Fosdick, Winton	20	1	28 3-5
A. Adams, Toledo	12	1	36 3-5
J. Williams, Winton	16	1	39 3-5
W. E. Eldridge, Toledo	12	1	56 1-5

ELECTRICS.

W. G. Titcomb, Waverley	3	1	16 3-5
W. E. Eldridge, Waverley	3	1	40 2-5
A. F. Neal, Waverley	6	2	25 2-5
A. F. Neal, Waverley	6	2	35 3-5

MOTOR BICYCLES.

Joe Downey, Warwick	1¾	0	28
Oscar Hedstrom, Indian	1¾	0	28 1-5
H. E. Rogers, Indian	1¾	0	30 3-5
George Temple, Indian	1¾	0	30 1-5

GRAND FINAL.

F. Durbin, Stanley	5½	0	16 3-5
Joe Downey, Motor bicycle	1¾	0	28
F. E. Randall, Stevens-Duryea	5	0	43 1-5
J. R. Snow, Peerless	16	0	43 2-5
J. R. Snow, Peerless	16	0	51 4-5
W. C. Titcomb, Electric	3	1	16 3-5

At the conclusion of the contest the officials and many others adjourned to the clubhouse on Boylston street and discussed matters. The officials were: Referee, Col.

James T. Soutter; judges, R. R. Sheldon, J. H. MacAlman, A. P. Underhill, George B. McQuesten, Dr. Shrigley and W. A. Woodworth.

The prizes were divided as follows: Mr. Durbin, the steamer prize, and free for all, Commodore Titcomb, the electric; J. L. Snow, the prize for cars over 2,000 pounds, and also that for cars with tonneau attached; F. E. Randall, for cars under 2,000 cars, and Joe Downey captured the motor cycle prize.

Hydrocarbon Automobile Without a Clutch.

W. C. Smith, of Merrimac, Mass., writes calling attention to a patent granted him under date of August 20, 1901, which he claims bears some similarity to the Selden patent in regard to its scope, and avoids the main Selden claims in the construction of gasoline automobiles. In comparing the first claim with the broad claim of the Selden patent it will be seen that the only real difference is in the position of the clutch or disconnecting device element. Mr. Smith places the disconnecting device between the propelling wheel and the road surface, while the Selden patent specifies it to be between the power shaft and the propelling wheel. The disconnecting device in the former patent is constituted by a road wheel lifting device. If one of the wheels is lifted from the ground the motor may be started without starting the car, as with a differential gear in the power shaft the raised wheel may move independently of the other. After the motor is started the raised wheel is let down to the ground. The patent states that no heavy flywheel is necessary, as the propelling wheel serves this purpose. We fear, however, that unless the flywheel was extraordinarily large the engine would generally stop when the raised wheel was let down to the road.

Long Motor Bicycle Tour Proposed.

F. Weber Benton and William Rodemacher, of St. Louis, propose to leave that city in a few days for Kansas City by motor cycle, where they will take the train for San Francisco. From San Francisco they will start on a motor bicycle tour 3,500 miles long, through Southern California, Arizona, Old and New Mexico, Texas and back to St. Louis. The machines they will ride weigh 175 pounds each. No more baggage will be carried than is absolutely necessary, a camera being essential, however. All through the journey Mr. Benton will take notes, which he will use in writing an account of not only the strange and interesting features which can be seen only in this way, but also of the working of the motor cycle.

The Duke of Ratibor, president of the German Automobile Club, has issued a warning to German automobilists cautioning them against fast and furious driving.

LESSONS OF THE ROAD

Extracts from the Journal of a Moto-Girl.

(Continued.)

For fear that readers will think Mr. F. and myself were always in trouble I will relate some of our pleasant experiences, of which we had a good many. In fact, on the whole, I think we were very fortunate, and it is no "fairy tale" when I say we ran a season, from June until November, with only one puncture, and that one our fault, because Mr. F. ran the auto into a back alley to replenish the gasoline.

Speaking of punctures, I would say that Mr. F. has concluded it is a matter of luck, as one man will run a season without one, while another with the same make of tires can't go a block without picking up nails.

One beautiful Sunday morning in June we partook of a hasty breakfast, and, while Mr. F. was adjusting things and oiling up, I donned my hat, which took time, two hat pins and an elastic being required, as it blows like a Western hurricane riding in an automobile. Mr. F. had filled the gasoline and water tanks the night before, so a few turns of the handle and we were off. Our first stop was at Salem Willows, a summer resort, where we ate a substantial lunch. Mr. F. also gave the auto some gasoline—not because it needed any but "so it wouldn't feel slighted." Then we took a stroll round the beach. The air was as mild as in midsummer, and we enjoyed it immensely. Tiring of that we started for Lynn, where we have several friends. Now if any of the readers of The Horseless Age are "sinners" enough to visit Sundays, did you ever notice that no matter what time you arrive it is just their dinner hour? Well, this case was not an exception, and although we assured our friends we had eaten, it was no use, we "must have some lunch anyway," so there was nothing left for us to do but follow our hostess into the dining room, where we were served to a good dinner, to which I am afraid we did justice, in spite of having to be coaxed. We then retired to the music room, where Mr. F. made things lively.

Mr. F. prefers daylight to ride in, so about 5 o'clock we lighted our big acetylene headlight and the side lamps and started for home. Everything went lovely, which made Mr. F. smile contentedly. He always smiles when the auto conducts itself creditably, but when it doesn't he says things that wouldn't look well in print, so we will change the subject.

For a business man who is confined to his office all day I would say there is nothing he will get so much pleasure out of as an automobile. He is bound to devote all his attention to running it, thus dropping business cares for the time at least, and he will gain in health, even though it costs him good money. In purchasing an automobile a novice naturally looks at the style of the carriage, the upholstery, nickel plate, etc.—at the outside rather than the inside. We would advise a person to look at the construction of an automobile rather than the motive power. In looking over the carriages at the Boston Show we noticed many of the light weight machines were not as strong as they should be in order to stand the wear and tear, particularly the steering device, which in many cases was weak. And I believe every auto should be equipped with two powerful brakes, as it means so much to you in case of an emergency.

One of the best trips we ever took was from Boston to Providence, over about 30 miles continuous State highway, which we made in company with some friends who own an auto of the same make as ours. Leaving Boston about noon we followed Washington street extension, through Forest Hills to Dedham and Pawtucket, where we left the State road, much to our regret. We arrived in Providence somewhere around 5 o'clock. Drawing up to the Narragansett House with a flourish we were shown the best rooms in the house, as the public seem to think if you own an automobile you are a millionaire. While the gentlemen were putting the autos in a nearby garage my friend and I washed some of the dust off of us. The next day we intended to visit Rocky Point, but took the wrong road and found ourselves at Warwick Light. The lightkeeper was very kind, and explained how they rang the big bell in the tower and how they took care of the light. Mr. F. in turn showed him the mechanism of our carriage, which he seemed quite interested in, but when Mr. F. got through he said he guessed he would rather have a horse. We then started back to the hotel, and the car went like a bird. So the next day we started for home in high spirits. When about half way to Boston the rod that connects the carriage came out, which stopped us on a little inclined plane, and made it look as if the front spring was broken, but on investigation it proved to be the rod, so there was nothing for the men folks left to do but get under the auto and go to work. When we got home Mr. F. had a heavier one made, and it never came off again. However, that little repair made, we continued on our way, reaching Boston in safety. But we had yet to go to A., and all went well until we reached Medford, when in turning out to pass a team we struck a part of the pavement that was wet, and skidded, turning a complete circle and landing as gently as if it was all a joke against the curb stone, with one wheel buckled under the auto and the rear axle bent. We soon had an audience, as it looked a wreck. A kind policeman put my friend and myself on a car, as we felt just a little bit nervous over it. Our men folks, with help from the by-

-s, got the vehicle into a nearby and, leaving it, went home in the auto. Mr. F. sent the repair men and they bent the axle into shape, ie wheel off and took it to the shop, tened the rim and put in about -five new spokes, which had broken Had we had wood wheels it would ly have meant a new wheel for us. o had the wheel steering taken off ever substituted, as there was almost lost motion, and we never felt quite ith it. We count it among our im- nents, of which we have many. The mportant I think is the extra pre- in regard to the rear wheels. To t them from coming out we had a ored through the hub of the side of the differential and through the and a steel pin smaller in diameter he hole put through and fastened otter pins, in case the set screw happen to strip, for without this tive the wheels could come out, as ed to a friend of ours. A key was to take the driving strain, and the re made smaller than the hole, so case there should be some wear in it would not shear the pins off.

evening on returning from W., a e of 14 miles, we were troubled with soline charge exploding in the muf- d back firing. It seems there had football game between the Andover keter rival teams, and it is the cus- at when Andover wins they paint n, as it were. We were just coming own as they were celebrating with crackers, revolvers, etc., and when ard us coming with our engine back and sounding like a gatling gun ave us the college yell, with three for the automobile, thinking we were the celebration.

another trip the nut on the tension sparking rod became loose and pre- our machine getting a spark (our n is by contact spark). So Mr. F. o his dress suit (overalls) and tight- he nuts. I would suggest to owners re their own chauffeurs that a good air of overalls that won't show up landscape like a golf jacket is a very thing to have with you if you hap- have on your Sunday suit and the hould happen to break, for instance, ou have to get down to "Mother " Well, in his haste Mr. F. forgot t the back of the carriage where his repose in a leather pocket, and he discover it until we were half way to he took one of the lamps off the nd went back to look for them; he find any of them, however, until we ver the same road the next day, but et wrench he valued was lost for- However, he had one made hand , which was very much stronger.

BROKEN CRANK SHAFT.

F. was very proud of the fact that d always gotten home on his own power. He had already done ambulance duty for two of his friends, one of whom had a broken inlet valve, and the other, who is the owner of a steam carriage, had burned his boiler out. One day he was to meet me at the train, and, as I was very tired after shopping all day and not feeling sure of getting a public conveyance, I was very much delighted to see the headlight of our dear old auto. It was late in the fall and quite dark at 6 o'clock. We lived about a ten minutes' ride from the station under ordinary circumstances. I had a few errands to do in the town, and as there was lots of driving about that time Mr. F. said he guessed he would stop the engine while I was in the store. When we were ready to go Mr. F. turned the handle, but to no avail. To quote Mr. Damon, "the motor refused to mote." Mr. F. did everything he could think of, but, as it was getting dark, he decided to hire a horse and have it towed home and find out the trouble in our own stable. I sat there an hour and shivered while Mr. F. went for the man, who wasn't at home, so had to wait for him; but they finally came with a horse. While they were hitching him in the man turned to me and said, "I thought this was a horseless carriage." I said, "Well, it was before you came with the horse." Our trouble proved to be a broken crank shaft, caused by advancing the spark too quickly.

First Three Weeks' Use of an Air Cooled Car.

By H. B. H.

With four automobiles and their accompanying breakdowns and troubles as well as their pleasures hidden in the dim mist of the past, I have ventured for a fifth time in the field of automobile purchase and am now the owner of an 8 horse power, air cooled gasoline car of the convertible two or four passenger type. I have had this machine upward of three weeks now, having ordered it at the show, and much to my surprise received it four days later than the date set by the manufacturers at the time the order was placed.

To date I have had nothing but pleasure with the car and it has come up to my every expectation as to power, speed and the ability to get there. If it continues at its present status for the remainder of the season my confidence in the manufacturers will be restored and I will be ready to acknowledge that the practical automobile is no longer a dream, but a reality, and a pleasing one.

I have averaged from 50 to 60 miles a day since receiving the machine and have given it some severe tests as to climbing long hills on the low speed, as I will confess I was a bit dubious as to its ability to keep cool, but I have been unable to overheat the cylinder.

Despite the simplicity consequent upon doing away with water tanks, circulating pumps, gasketed cylinders, explosion chambers, etc., I have been stalled a half dozen times, but in each instance the trouble has been due to my own ignorance and no fault of the machine or its construction.

STOPPED ON A HILL.

On my second trip, which was made through a very hilly country, for the distinct purpose of testing the cooling system, the motor suddenly stopped while on the steepest portion of a long hill. I set the auxiliary brake which applies on the rear axle and got out to look for trouble, allowing the friend who was with me to remain in his seat, as he knew nothing about automobiles and could be of no assistance.

I at first thought that my gasoline supply was exhausted, but a look into the tank proved that this was not the case, and I then decided to go through the starting operation in hopes that the engine would resume its motion. Upon relieving the compression and turning over the crank I could hear the spark breaker working, but upon allowing the inlet valve to reseat itself I found that I could not get any compression whatsoever. This was a new feature to me, a trouble that I had never experienced before, and I at first thought that the cam shaft must have slipped around so that the valves did not open properly. Investigation proved that this was not so, and upon looking further I found that the exhaust valve had become hot and stuck, the spring provided for the purpose not being strong enough to pull it back into place. A little oil to cool off the bearing, and the valve snapped back and seated, and this difficulty was disposed of.

A QUEER ACCIDENT.

Walking around the machine again I noted what appeared to be a gasoline leak in the carburetor, which in this particular wagon is located directly under the floor boards beneath the driver's feet.

I hastily shut off the gasoline supply at the tank and then proceeded to take the carburetor off, it being only necessary to take off one gasoline connection and remove a thumb screw. I could not find a leak in it anywhere, and so put the carburetor back into place, but the moment I turned on the gasoline supply the fluid ran down the side of the mixer.

I then noticed that the little priming cock, which on this machine is used to drop a quantity of gasoline on the suction screen to make starting more certain, had caught on my sleeve when I first got out of the machine and had been running all along. I shut it off and then had a new trouble to contend with, as the cylinder was full of gasoline and the engine would not start.

It was, of course, necessary to get this gasoline out of the engine, and as the quickest method I disconnected the wire and took out the spark plug. A few turns of the crank cleared the explosion chamber, and after the plug was put back, a half turn of the crank started the engine again and we were off on our trip.

I had no further experiences this day, but the very next afternoon I was stalled for an hour as the result of nothing more than thoughtlessness on my part. I had stopped

the machine at a friend's house, and in getting near the curb was compelled to run down in the gutter, which was rather deep at this point, so much so that the left hand side of the machine was 6 inches or more higher than the right.

RESULT OF STANDING SLANTWISE.

After a stay of a half hour or more I came out and prepared to start the engine and return home, but despite all the cranking that I could do it would not go and I could not get a single explosion. I dissected the sparking apparatus, only to find that it was in first class working order, and finally, after working for another half hour, my friend suggested that perhaps I had no gasoline. I looked in the tank and saw that there was a good quantity of the precious fluid there, but at the same time I noticed that the slant of the carriage had sent it all over to one side of the tank and that side happened to be exactly opposite to the point where the feed pipe led down to the carburetor. This portion of the tank was high and dry, and after my friend and I had dragged the machine out on the level the engine started without the slightest difficulty on the first turn.

SPARK POINTS.

A few days after this I was stalled, owing to the fact that the two platinum points that break the spark and which are adjusted one sixty-fourth of an inch apart had come together, the set nut that held them in place having loosened. It cost me forty-five minutes' work and a clean pair of cuffs to remedy this little trouble.

On the same day I had the misfortune to pick up a wire staple in the front tire, which punched five holes in the inner tube before I discovered it. Oddly enough these holes were all around that portion of the tube where the joint comes, and as it was impossible to properly patch it I was compelled to purchase a new one.

The auxiliary brake binding one afternoon heated up until it almost stopped the machine and nearly cost me one of the long side springs on which this machine is suspended, for had I not discovered it at the time I did the motor pull would have doubled up the spring and snapped it off. Loosening a set nut and oiling the metal band clutch and surface proved to be a good cure.

ENGINE GETS A MUD BATH.

Neglect on my part to use the mud protectors provided by the manufacturers allowed the front wheels to throw mud on the cylinder, which lodged in the porcupine radiating pins and caused the engine to heat slightly, as the air could not strike the cylinder properly. The trouble disappeared, however, when the mud was washed out.

Altogether I have found this particular machine all that I expected and I am anxiously awaiting July weather so that I can more thoroughly test the air cooling system.

STAR GASOLINE CAR.

Trade Literature Received.

"The First Real Automobile for Boys and Girls."—The Kidmobile Manufacturing Company, Jackson, Mich.

Second Hand Machine Tools.—The Garvin Machine Company, Spring and Varick streets, New York city.

Goodyear Tires.—The Goodyear Tire and Rubber Company, of Akron, Ohio.

Orient Motor Buckboards and Automobiles.—Catalogue C of Waltham Manufacturing Company, Waltham, Mass.

"Of Interest to Battery Users and Others."—William Roche, 42 Vesey street, New York city.

Thomas Tonneau, Model 17.—E. R. Thomas Motor Company, of Buffalo, N. Y.

"Carriage Trimmings and Hardware. Catalogue No. 15."—Metal Stamping Company, 468-472 West Broadway, New York.

NEW VEHICLES AND PARTS.

The New Star Gasoline Car.

The Star Automobile Manufacturing Company, of Cleveland, Ohio, are now exhibiting their first vehicles, built after designs of their engineer, G. R. Albaugh. The company have been engaged for years in the manufacture of special machinery and should therefore be well equipped to turn out a first class machine. We are furnished with the following description of the vehicle:

It is emphatically American throughout, though possessing a French tinge in general appearance. It is of the detachable tonneau type, with bonnet in front and single cylinder motor located horizontally in the centre of the frame; but the reverse of the customary practice is that the cylinder head and accessories are directly under the footboard. By raising the footboard and seat panels the entire mechanism is in plain view and readily accessible. It is not necessary to remove the body to make adjustments, though the loosening of four bolts allows the body to be lifted from the frame.

The car weighs 1,200 pounds with tonneau and is propelled by a four cycle, water cooled gasoline motor, developing 8 brake horse power. Four piston rings are used and are returned and ground to perfect fit after being split. The two to one gears are enclosed in the crank case, which prevents noise and insures constant lubrication.

The carburetor is well worked out and starts the motor on the first turn, a fact to be appreciated. It has the efficiency of the French spraying type and the positive action of the mixing valve and really combines the two principles. The carburetor and improved muffler obviate obnoxious noise and odors.

The power is transmitted through planetary gears, giving two forward speeds and a reverse, assembled direct on the engine shaft and enclosed in an oil tight and dust proof casing. The direct drive high speed is operated by means of an adjustable friction clutch. The chain is especially heavy and capable of withstanding all the severe strains to which it is liable to be subjected.

The American Ball Bearing Company's latest pattern rear axle is used and is fitted with a Brown-Lipe spur gear differential. The wood artillery wheels are 28 inches in diameter and are shod with 3 inch detachable tires. Tilting wheel steering through a worm and worm wheel sector is employed. The cooling system consists of a rotary centrifugal pump coupled direct to the shaft of the engine, which forces the water through the jacket surrounding the cylinder, then into the tank, located in the bonnet back of the gasoline tank. From the tank the water, before reaching the pump, passes through a flanged cooler of ample radiating surface, which is located under the bonnet just ahead of the front axle.

In starting the motor the compression is relieved by slightly shifting the roller on the

st push rod to come in line with a on the surface of the cam, which unthe exhaust valve during part of the ession stroke.

: ignition is by jump spark with an ved long life commutator. This car ntrolled by throttling the induction e and shifting and spark, and any between 2½ and 30 miles an hour be obtained. The gasoline tank holds llons, a quantity sufficient for a 300 run.

: reachless running gear is made of a el iron frame with radius rods, mount- 36 inch semi-elliptic springs, which, the long wheel base, insures ease and ort in riding.

: body is luxuriantly upholstered with buffed leather and curled hair stuffing painted a bright automobile red, deli- striped with green and gold.

The Overland Gasoline Car.

ight gasoline car with a number of ial features has recently been put the market by the Standard Wheel pany, of Terre Haute, Ind. The car runabout body and differs in the gen- arrangement of parts considerably the usual type of American made ine runabout.

: engine is a single cylinder vertical of 5 horse power, fitted with jump ignition and capable of regulation een the speed limits of 150 and 1,800 ations per minute. The water jacket t in one piece with a cylinder, and all d joints are said to be avoided. The nt for the ignition is furnished by batteries, of which two sets are car- a two way plug switch being provided ange over from one set of batteries e other. The plug is held in place by ing, and may be removed and carried e pocket when the machine is left standing on the street, to prevent any unauthorized person from starting it. The speed of the motor is controlled by means of a throttle and the spark timer, the levers for both being placed at the side of the seat.

The transmission gear gives two forward speeds and one reverse, and is entirely cut out on the high gear. The slow forward and reverse speeds are obtained by applying friction bands, and the high forward speed by throwing in a friction clutch. All the gears are cut of steel and are said to run in a bath of oil, which makes them practically noiseless, efficient and long lived. The gear is not placed upon an extension of the engine shaft, as is the usual practice with this type of car, but is driven from the engine crank shaft by means of a roller chain. From the change gear the power is transmitted to the rear axle by a roller chain running on a sprocket fixed to the differential gear. Radius rods keep the gear axle in position and provide means for adjusting the tension of the chain when made necessary by wear. A Diamond roller chain of three-quarters inch pitch and five-sixteenths width of block is used. The differential is a Brown & Lipe spur gear type, entirely enclosed.

The frame of the car is built up of wood, reinforced by continuous steel plates, rectangular in shape and firmly attached to the wood frame. The rear axle is 1 inch in diameter and runs in roller bearings in 2 5-16 inch steel tube sleeves. The front axle is of 1½ inch steel tube and the front axle bearings are of the ball type. Long, semi-elliptic springs are used to support the body on the frame and are fastened to the axles by drop forged hangers. Wood artillery wheels are used, having twelve spokes each, and an improved design of hub with a long nickeled dust cap.

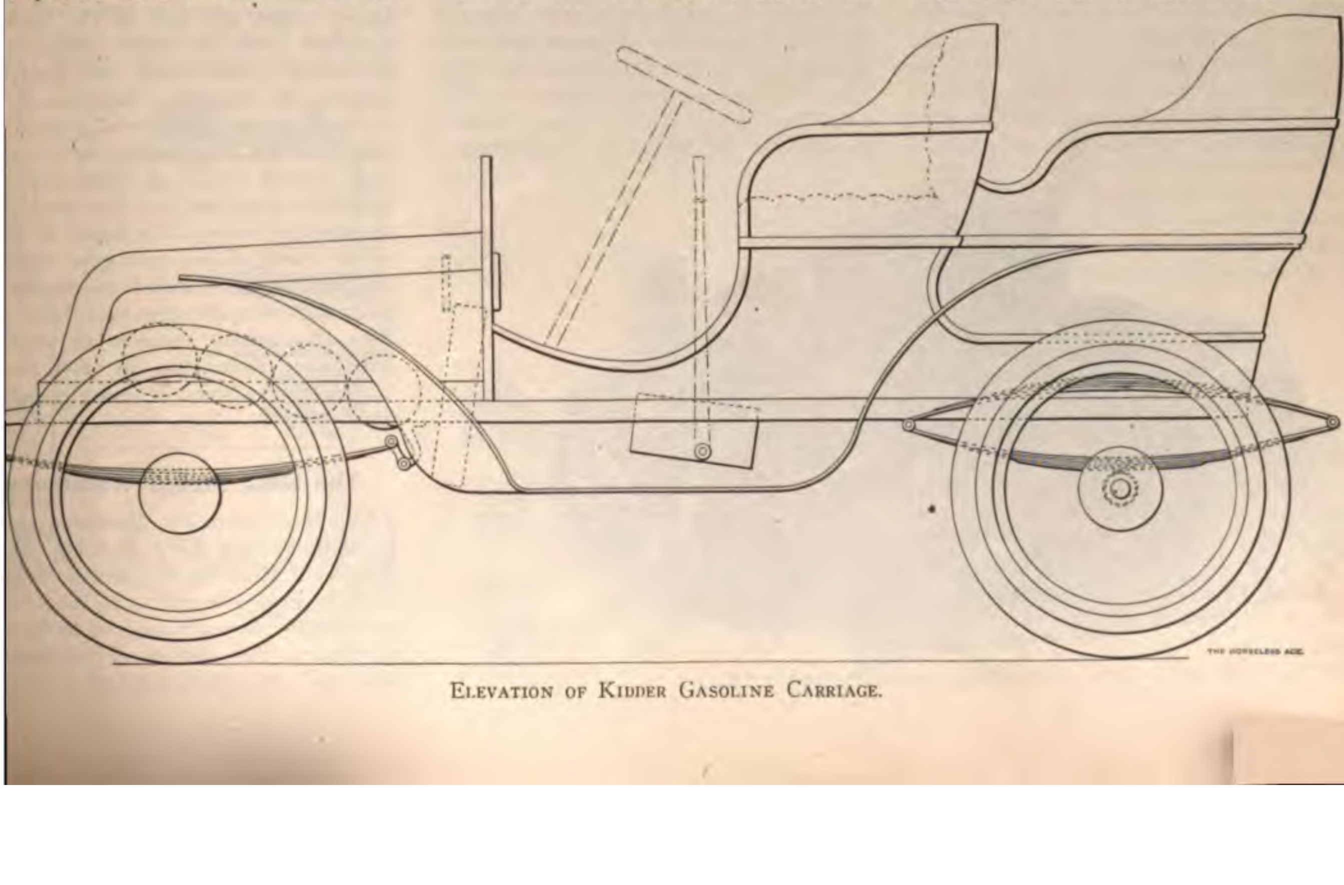
The car has two separate brakes, one

Overland Gasoline Car.

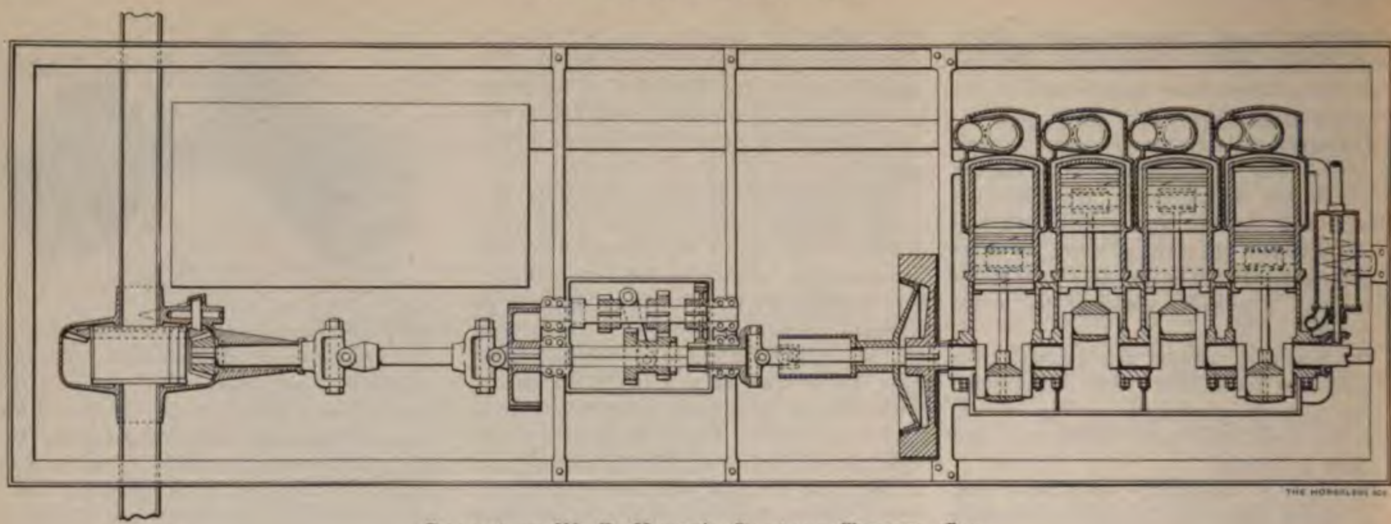
acting on the differential gear case and the other one on the transmission. The car complete with tanks filled weighs 650 pounds and is claimed to be capable of going at a speed of 20 miles per hour and taking all ordinary grades. The gasoline capacity is claimed to be sufficient for a run of 75 miles. The tires are Goodrich, 2½ inch clincher. Steering is by a lever centrally located and the body is of the runabout type, with solid back and sides, and with a space under the seat for luggage. The standard finish of the car is dark automobile red with stripes in black and gold, and the upholstering is in dark green leather with spring back and cushion.

New Gasoline Car Design of W. P. Kidder.

Believing that the gasoline type of vehicle will share with steam in the development of the automobile industry, W. P. Kidder, of Boston, in addition to his design of direct gear driven steam car, has gotten out a novel design for a 20 horse power gasoline touring car. The work upon this car was begun in September last, we are informed, and the parts are now nearly ready for assembling. The features of this car are its four cylinder horizontal engine, located at the front of the car, and direct bevel gear drive to the rear axle. The arrangement of four cylinders on one side of



Elevation of Kidder Gasoline Carriage.



CHASSIS OF W. P. KIDDER'S GASOLINE TOURING CAR.

the crank shaft, with direct bevel gear drive to spur gear differential on rear axle, Mr. Kidder believes to be new with him and embraces the following advantages

No part of either cylinders or crank case projects below the base of body, leaving a clean under line, without appearance of cumbersome weight. As compared with vertical motors, the pulsations of the explosions act at right angles to the direction of the spring action, meeting a comparatively rigid resistance, thereby reducing vibration. The centre of gravity is low, very little of the motor being above the base of the body, requiring only a low bonnet. The small vertical space occupied by the motor especially adapts the same running gear and mechanism to a wide range of use from the family surrey and tonneau to the omnibus and delivery wagon. The crank case and many other important parts are more conveniently accessible.

The following specifications have reference to the two illustrations herewith. The weight of the car complete is 2,000 pounds. The wheel base is 90 inches; the tread, 54 inches, and the artillery wood wheels have 8 inch diameter hubs, 1⅜ inch spokes and 33x3½ inch double tube, clincher tires. The rear live axle is of solid steel, 1¾ inches diameter, encased and runs in oil. The bevel gear drive on the rear axle comprises a wheel of 12 inches pitch diameter, with teeth of four pitch and 2 inches face, and provided with an enclosed frustum roller to take up side thrust, and a pinion of 3½ inches pitch diameter. The front axle is 1½ inches in diameter and has Billings & Spencer drop forged steel steering forks and knuckles with roller bearings. Irreversible wheel steering is fitted, the wheels swinging forward for entering the car. The main frame is reachless, constructed of 2x2x¼ inches angle steel, and trussed. It is supported in front by semi-elliptic springs 40 inches long and 2 inches wide, and in the rear by full elliptic springs of the same length and width.

The cylinder dimensions of the motor are 5x5 inches. The crank shaft is of 1¾ inches diameter and has five journals, each 2⅝ inches long. The crank pins are the same diameter as the journal and 3 inches long. The flywheel for the cone clutch is 17 inches in diameter and weighs 100 pounds. Both the inlet and exhaust valves are arranged vertically, identical in size and mechanically operated; they are 2¼ inches in diameter and are so arranged as to be easily removable. The ignition is automatically timed by a governor. The engine speed is controlled by a gas throttle and the water is circulated by an enclosed screw propeller positively driven by gears.

The car has sliding gear transmission giving three speeds forward and a reverse, with direct drive on high gear. The cone clutch is of large diameter without end thrust. Two operating levers are used, one for sliding gears and the other for the clutch and brake. An interlocking device between the operating levers prevents change of gears except when the clutch is disengaged. The change gear box and motor are both provided with independent three point suspension. A universal joint in the driving shaft between the motor and the gear box and again between the box and the rear axle provide for all elastic twist of the main frame over uneven ground without cramping. The lubrication is positive. Two powerful internal expanding brakes act on drums on the rear hubs, and are operated by foot.

Among the novel features of Mr. Kidder's latest steam car is the four cylinder single acting motor of 2½ inches bore and 3 inches stroke. These cylinders are placed within the heat of the burner, as it comes from the boiler tubes, thereby preventing condensation and greatly increasing the efficiency. Superheated steam is taken through a universal jointed steam pipe from the superheating coil in the fire box, special means of lubrication being provided, something on the lines of the the gasoline motor. The motor is attached to the casing of the spur gear differential on the rear axle, sealed completely from dust, and all parts run in a bath of oil. This arrangement removes all mechanism from view under the car, and from its compactness admits of more satisfactory body design.

THE BOSS STEAM AUTOMOBILE.

The Boss Steam Automobile.

The Boss steam car illustrated herewith is built by the Boss Knitting Machine Works, of Reading, Pa., and is the design of J. L. Eck, who claims to have built an automobile five years ago and to have been the first in that section of the country to take up motor car construction. The car

hown is said to be fitted with all the improvements in the steam line and handsomely finished. The water tank 35 to 40 gallons and the fuel tank 12 s, which suffices to make a run of 100 miles without replenishing the fuel. a gasoline or kerosene burner is fit- d the equipment includes a Klinger gauge, generator and pilot light, au- c fuel regulator and control from seat ater and air pumps. The wheel base inches and the tread 54 inches. The g gear is of a special flexible design actured by the company and marketed tely.

me New Spark Gap Devices.

auxiliary spark gap device discovery ertainly created a stir among parts facturers, attachments embodying this ion increasing in number almost daily. levices may generally be classed under eads, those intended to be connected spark plugs directly and those made ly separate and intended to be at- l to the dashboard of the car. Most e devices are made adjustable. A f the most recent types are illustrated riefly described herewith.

MOSLER'S DEVICES.

hur R. Mosler, of 309 Broadway, New city, now makes his spark plug so as nbine an auxiliary gap device and also factures a special device requiring no l support, which can be connected ere in the spark. The spark plug fitted with the special attachment has rojecting part of the porcelain sur- ed by a length of hard fibre tube and en this tube and a brass nut on the end of the central terminal is clamped p of fibre three-thirty-seconds of an hick. At the outer end of this fibre s fastened a simple binding post, con- of a machine screw, two brass nuts milled edges and two copper nuts. A of brass wire is clamped under the of the two nuts and extends to within the vicinity of the nut on the central terminal. Should the battery become weak and the pressure be too low to bridge the two gaps the wire may be bent into contact with the nut on the central terminal.

The separate spark gap device is remarkable for its small size. A short length of one-quarter inch glass tube is forced into a somewhat longer piece of one-half inch hard rubber tube with an opening cut into the wall at the middle of its length. Into one end of the hard rubber tube is screwed a brass screw with a pin point. A brass cap is screwed over the other end of the hard rubber tube and is threaded centrally to receive a threaded nickel steel pin forming the adjustable terminal. The connections are made by means of two milled brass nuts on the nickel steel pin and by a nickel wire on the opposite ends.

THE WILLIS DEVICE.

The device marketed by E. J. Willis, 8 Park place, New York city, is also extremely compact, the overall length being only 1 9-16 inches. The drawings clearly show the construction, the device comprising a hard rubber base of cylindrical form with a large central cut-out, into which is placed a glass tube. Terminal screws pass into the glass tube from each end and are provided with double knurled nuts, between which the wires of the circuit are fastened.

THE "PANHARD SPARK GAP."

The "Panhard spark gap," manufactured by the Auto Novelty Company, of Cleveland, Ohio, consists of a handsomely finished electrical instrument which may be conveniently attached to the dashboard of an automobile. It has a polished aluminum casing, measuring 3x4 inches, by 1 inch in depth. It is fitted with an insulated internal base of black polished vulcanized rubber, supporting the terminals of an auxiliary air gap in the secondary circuit of an induction coil, which terminals are constructed of adjustable brass posts tipped with platinum contact points. The casing is closed with a removable beveled French plate crystal.

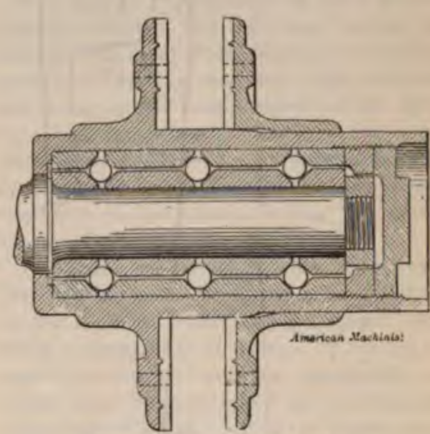
Located on the dashboard the device makes a convenient visual indicator, showing at a glance what is occurring in the secondary circuit, as it gives a duplicate spark every time one occurs at the sparking plug or plugs in the cylinder or cylinders.

THE OSCILLUM.

L. C. Herz, of 103 Pineapple street, Brooklyn, has brought out a device, marketed under the above name, which serves a double purpose, providing an auxiliary spark gap and acting at the same time as a connector. The central part is made of hard fibre and the terminal screws of brass. The device when inserted in any part of the secondary circuit acts as a condenser, and by the sudden discharge into the spark plug forces the shortest path and pass between the points even if the plug is sooted.

The Gurney Ball Bearings.

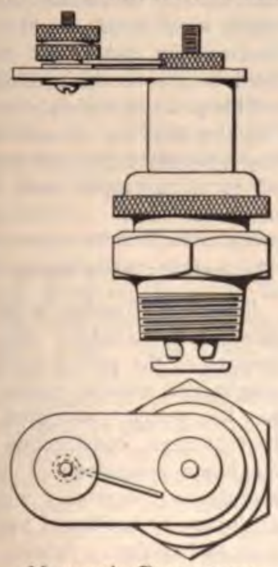
The accompanying drawing, from the *American Machinist*, shows the construction of this bearing as applied to the wheels of a truck for the Westinghouse Machine Company at East Pittsburg, Pa. The novel feature is in the provision for equal-



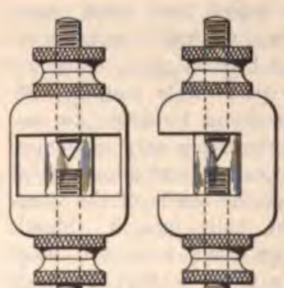
GURNEY BALL BEARINGS.

izing the bearing on each set of balls. The rings which form the races for the balls, while all held in by the nut at the end, are free to move endwise individually enough to equalize and distribute the pressure over all the balls in case of wear or imperfect alignment. For heavier service the rings may be made narrower and more sets of balls may be introduced in the same length of bearing. For shafting or other places appropriate means of securing the rings will suggest themselves. The bearings are made either solid or split, as required. They are made by the Gurney Ball Bearing Company, Jamestown, N. Y.

LER'S
GAP
ICE.



MOSLER'S PLUG WITH AUXILIARY GAP.



THE "E. J."

"PANHARD SPARK GAP."

Maintenance. and Repairs.

I—How to Take Up Wear in Eccentric Straps and Link Connections.

With the ever and rapidly increasing use of the automobile, the subject of economical repairs upon the machine becomes one of considerable importance.

At the present rates for this class of work any but an experienced repair man may run up a bill for the owner which the latter would be justified in terming exorbitant; while a trained and experienced man, thoroughly familiar with the ma-

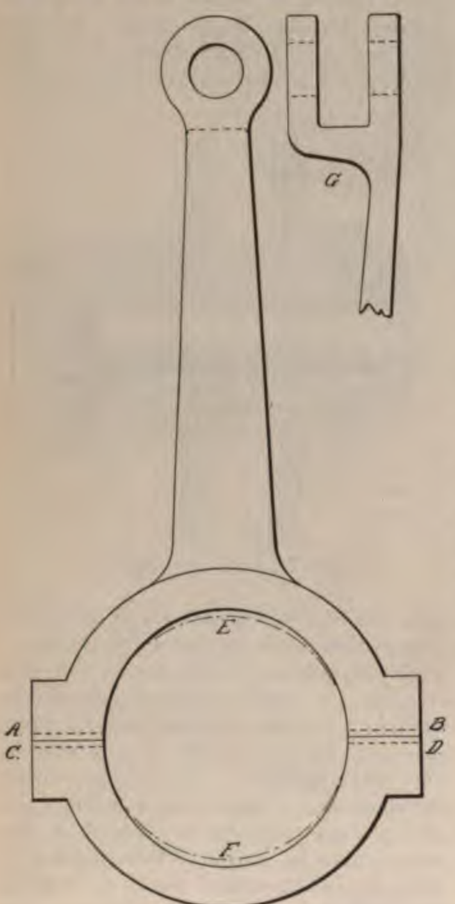


FIG. 1.

chine undergoing repairs would, by virtue of this familiarity, be able to expedite matters and execute a workmanlike job, provided always that his assistants and himself are conscientious men.

The writer has had, during the past five years, a large and varied experience in this line of work, embracing repairs or alterations or both upon most of the representative makes of American machines, and on this account may be qualified to express a few opinions as to the best and quickest methods of executing repairs.

While such opinions may and doubtless will be of greater value to the ever increasing army of repairmen throughout this country than to the individual users or owners of machines, yet there are many little repairs which, with a few ordinary tools and a little good sense, these latter may accomplish without outside aid.

This article will deal with repairs upon vehicles using explosive motors or steam engines as motive power, and will aim also to impart information tending to forestall a certain class of accidents by anticipating them.

An effort will be made also to present in a comprehensive manner various little devices, constituting additions and improvements to machines whereby their ease of operation and repair is facilitated or economy in running is increased.

The early types of steam machines, owing to their rather light construction, come in for their share of treatment, and not infrequently it would seem, a little more than their share. A prolific source of trouble in the engines of these earlier machines lies in the eccentric straps and links and blocks of the reverse and cutoff gear. These wear loose in an incredibly short space of time, especially where the engines are not enclosed, and are, therefore, open to the ravages of flying sand and grit. Most of these eccentrics are ball bearing, and the alternate push and pull in the operation of the engine tend to wear the straps which surround the eccentrics themselves out of round, with the longer axis of the resulting oval in line with the length of the rod.

The wear which takes place upon the eccentrics themselves does not tend to throw them out of true to any appreciable extent, but simply wears the ball race or groove a little wider and deeper. To correct the looseness in the eccentric straps, the simplest way, and one which effects its object as well as anything except new parts, is to file the ears or lugs which fasten the halves of the straps together. This is shown in Fig. 1, where lines A B and C D indicate the portions to be filed.

The amount of metal shown to be removed here as well as the degree of oval in the eccentric opening are greatly exaggerated for the sake of clearness. In filing these joints care must be exercised to make the surfaces square with the sides of the strap, which condition may be determined by the frequent use of the try square, and to have the new surface parallel to the old, as regards its direction lengthwise. File the parts down, taking off, as nearly as possible, the same amount of metal from either half, until, when clamped together, over the respective eccentrics, with the balls in place, there will be just a barely perceptible motion, indicating that there is no binding. In putting the balls in place, it is very convenient to employ the so called hard oil, smearing some of this over the inside of the straps and sticking the balls into it. Should there, by mistake, have been too much metal removed in filing, so that the straps bind upon the balls, a thin sliver of sheet metal may be cut to shape and inserted in the joint, being held in place by a clamping screw.

In theory the opening in the strap will not be a true circle when thus treated, but in practice it will be found close enough to work well for a long time. Should the parts be very badly worn, it may be found necessary to file the inside of the strap at points E and F, Fig. 1, to prevent these places from rubbing upon the eccentrics.

The upper ends of these eccentric straps are usually in the form of a fork, as shown by the small sketch G in Fig. 1. The pins which pass through the holes in these ends and through the hole in the end of the link, as well as the holes themselves, also wear rapidly, and to repair or renew these points the best way is to ream out the three holes together, after having fitted the eccentrics and put them into their respective places permanently, and put the links into place with the old pin in one end to hold it in position.

Then turn up a new pin from best drill rod, having a head upon one end and a hole for a cotter pin in the other. It will be understood that in reaming out these holes a reamer as little larger than the old hole as possible should be used, so as to avoid weakening the parts unnecessarily. In making the new pins much time will be saved by departing from the conventional form of pin and using drill rod, which may be secured in almost innumer-

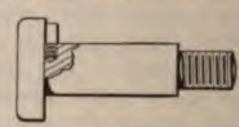


FIG. 2.

able diameters, getting a diameter which will fit the new holes nicely, and simply drilling a hole for a cotter pin in either end. This saves the labor of turning in the lathe and fitting. This same treatment will answer for the holes through the link block and lower forked end of the valve stem, but in this case the pin will have to be made anew, since in its usual form it has a threaded end for a locking nut, and a sort of key under the head to prevent its turning.

This pin and a simple method of inserting the key are shown in Fig. 2. The key is simply a piece of round wire threaded to fit a tapped hole drilled just beneath the head.

Essentials of a Good Auto Boiler.

Francis E. Stanley, in his talk at Boston referred to elsewhere, said the chief requisites of the perfect boiler are minimum weight and cubical contents in proportion to its output, maximum capacity for heat storage, construction to absorb the maximum percentage of heat, economy in manufacture, durability with small liability of injury by accidental neglect, ease of repair, and ability to furnish steam at a uniform temperature, and at any pressure required to run the engine.

...OUR...
GN EXCHANGES

eting Agents for Alcohol.

by M. E. Sovel before the Alcohol Congress in Paris.)

ated alcohol, such as is generally ndustrial purposes in France, in : with the requirements of the tion, is a liquid of specific gravity ' C., showing 90° on the alcohol- le, although one may employ a if alcohol of 95° and methylene

inecessary to state that this sub- completely combustible without But as its principal constituents— hol, methyl alcohol and acetone— nized compounds, the amount of lable on the combustion of one of this mixture is necessarily re- the presence of oxygen either in :ules of the combustible or in the water.

rmula of Redtenbacher,

$$o\,C + 34500\left(H - \frac{O}{8}\right) - 650\,H_2O,$$

mits of determining approximately ific power of an oxygenized com- containing water, gives for the :alorific power of a kilogram of de- l alcohol consisting of 100 volumes thyl alcohol of 90° and 10 volumes nethyl alcohol of 90°, 5.521 calories. ue is not applicable to the average ted alcohol, because the methylene idministration is not the same as ilcohol containing 10 per cent. of

uthor has determined the calorific f a sample of the usual composition id a value higher than 5,906, while yl alcohol of 96° develops 6,195 cal-

principal liquid combustibles being the litre, and not by the kilogram, of the ordinary denatured alcohol s $5906 \times .835 = 4931$ calories. On er hand, the liquid mineral fuels, the light distillates of petroleum ie), develop on an average 11,500 per kilogram and weight about .700 ns per litre. The litre produces, e, 8,050 calories.

rue that denatured alcohol requires complete combustion only 6 cubic of air per kilogram, in round fig- hereas the light distillates of petro- quire about 11.85. As a result, the carried off by the burnt gases are maller in number in the case of al- han in the gase of gasoline, and the ice is still increased in favor of alco- ne considers the results of the analy- de by the author on the occasion of ernational competition of 1902, which that in actual practice it is necessary with the combustible vapors from .7 times the weight of air theoretical-ly necessary, in order to secure good combustion.

Whatever may be said on the subject, ordinary denatured alcohol is still inferior to the light distillates of American petroleum.

In connection with the use of alcohol alone in motors another difficulty presents itself—that relating to the starting of the motor in cold weather. In an experimental investigation made by the author during 1902, at the instance of the Minister of Agriculture, the conditions of temperature under which denatured alcohol may be vaporized in a quantity of air consistent with good combustion were studied. It was found that if the theoretical quantity of air was used the mixture, cooled by the evaporation of the alcohol, must not be allowed to descend below the temperature of 26° C., or it would not be homogeneous; that if 1.3 times the theoretical quantity of air was used, the temperature must not descend below about 22°, and with 1.7 times the theoretical quantity the temperature must not descend below 17°, in round figures.

If it is remembered that the vaporization of 1 kilogram of denaturated alcohol under these conditions absorbs about 288 calories, it will be understood that the starting of a motor fed by simple denaturated alcohol is troublesome, and is accompanied by incomplete combustion, resulting in the production of lampblack (partial oxidation in the form of aldehydes and acids). Further, it seems that the deposition of tar and lampblack on the surface of the admission valves, and sometimes on their passages, is due to the formation in the carburetor of non-homogeneous mixtures containing particles of liquids which decompose when coming in contact with the metal parts superheated by the previous explosions.

The researches of the author in this line are not yet sufficiently advanced to allow of a definite opinion on the modus operandi of the sooting of the valves. It may, however, be stated that this difficulty is not to be considered as inherent to denaturated alcohol itself, but rather as depending on the method of its vaporization, because in tests on forty-two stationary machines by the jury of the international competition of 1902 it was found that in a certain number of motors the valves were not in the least affected, while in others these parts were fouled, or nearly inoperative, after only a few hours of running.

After the preceding observations it will be admitted that it was very appropriate to inquire what advantages were offered by alcohol as a motor fuel, while at the same time attempts were made to diminish its defects or shortcomings by the addition of substances of greater calorific power, more volatile and having a lower latent heat of vaporization, thus permitting it to be vaporized, by being carried in suspension, under temperature conditions conforming more to the exigencies of practical work. This led to the addition to the alcohol of various carbureting agents (carburants). Denaturated alcohol carbureted with 50 per cent. of benzol of 90° develops 7,878 calories, and in its vaporization absorbs only 196 calories.

In order that a substance capable of carburetting alcohol may be practically available, it must be perfectly soluble in alcohol at all temperatures encountered in practical work. It must be at least equally volatile as alcohol, yet not too volatile, in order that the mixture formed may not be more volatile than the two components, and behave like a stable substance with a high vapor tension, and give off vapor of uniform quality. These conditions are far from being satisfied by any of the substances proposed as carburetting agents. The ones that fulfill these conditions best at present are benzine (C_6H_6) and benzol of 90°.

The heat of vaporization of these carburetting agents is relatively low—about 120 calories; the heat of combustion of the vapors is between 10,000 and 11,000 calories, according to the composition of the mixture and according to whether the combustible is considered in a liquid state or as already vaporized. The temperature of ebullition of raw benzine is 80.4° C., nearly the same as that of alcohol of 90°.

It should be noted in this connection that benzine and benzol, the same as many of the light derivatives of petroleum, may cause a great deal of trouble by reason of their admixture of sulphur compounds, of which may be mentioned as an example thiophene, C_4H_4S. Such a constituent, which is, moreover, very difficult to eliminate in practice, is open to the same objection that is made to poorly purified illuminating gas, that in the apparatus in which the combustion takes place sulphurous anhydride is separated, which is very objectionable. This difficulty deserves to be pointed out to the manufacturers of carburetted alcohol, because lamps burning such alcohol have been the cause of much justified complaint, and motors may show signs of corrosive effect, which is generally thought to be due to the alcohol. The latter may possibly add to the effect, but only in a small degree. The author has had occasion to talk to refiners on this point and to discuss the cost of desulphuration as employed in laboratories. It seems that the cost is generally much too high. According to some American patents, however, the use of metallic copper seems practical.

From a theoretical standpoint the less complicated a mixture the greater is the facility of its use. It would seem, therefore, that if we were to return to the benzine of petroleum, which is the most common carburetting agent, it would be best (assuming the price to be acceptable) to employ benzine (C_6H_6), and not mixtures of this compound with homologous substances. This is not the case, however, since the re-

ciprocal solubility of benzine and alcohol of 90° is not complete. Although there can be no question in practice of benzine charged with alcohol, and although the maximum degree of carburation of alcohol seems to be represented by a mixture of equal volumes of the alcohol and the carburetting agent, the author investigated still richer mixtures. He found that a carburetted mixture of 75 per cent. is unstable at 18° C. and separates into two layers. With a mixture of 70 per cent. the separation takes place at +2° C.; with a mixture of 65 per cent. at —1° C. Below this ratio of carburation no separation of the two liquids was observed, but crystallization of all or part of the mixture would occur. This phenomenon is rendered very irregular by suffusion; some poor mixtures will crystallize when a rich mixture remains liquid; to obtain a regular rate of crystallization it is necessary to introduce a few crystals of benzine into the mixture cooled to a known temperature. It has been ascertained that all mixtures containing more than 40 per cent. of benzine solidify under these conditions at —5° C., and that it is necessary to go down to 35 per cent. of benzine in order to have no solidification at —19° C.

Of all its homologous substances, benzine of 90° is the only one which crystallizes readily, and a substitution of benzol of 90° for benzine appears, therefore, quite indicated. The author has confirmed that it is necessary to descend to —18° C. to observe the separation of a mixture of equal volumes into two layers; and at —20° C. the separation is nearly complete; at —20.5° C. there is crystallization. In consequence it is advisable to adopt as a carburetting agent benzol of 90° instead of benzine, both from the standpoint of homogeneity and from the standpoint of cost.

The objection has been raised against alcohol carburetted with benzine that it removes the lubricant from the cylinder walls of an engine and thus permits these walls to be attacked by the acetic acid which frequently results from a carburation at a too high temperature or from incomplete combustion. Some inventors have proposed to dissolve in the alcohol, by the aid of the benzine present, 5 to 6 per cent. of kerosene. It appears that part of this oil does not burn and acts as a lubricant for the cylinder. At any rate the useful effect must be very slight, as it is more common to have too much oil from the crank case splashed into the cylinder.

Other experiments have been made with a view of partially substituting gasoline for benzole. It appears that 18 per cent. of the benzole may be replaced with gasoline of a specific gravity of .680 to .700. These attempts have been unsuccessful, probably for economical reasons, owing to the sudden reduction in the price of benzole.

Nevertheless, the use of a triple mixture —ordinary alcohol, amyl alcohol, gasoline —has appealed to a number of inventors, and particularly the Russian refiners. We shall see in the following that such a mixture, made of little volatile products, cannot give a good vaporization. One must not be misled by the word "amyl alcohol" when the oily products obtained toward the end of the commercial process of rectification are considered. These products consist of a variable mixture of water, ethyl alcohol, isobutylic alcohol and amyl alcohol. Such a mixture is capable of dissolving at a temperature of 15° C., to the extent of 15 per cent., 35 per cent. of the light distillates of petroleum, in comparison with 50 per cent. of denaturated alcohol of the administration, but in many cases the mixture separates at +4° C. In order that no separation may take place at temperatures which are practically met with in winter, there are necessary, on the one hand, amyl alcohol almost chemically pure, and on the other gasoline of very high volatility. In addition alcohol of 95° must be used, which considerably raises the cost of the product.

It remains to be seen what takes place in poor carburetors where the complex mixtures which we have studied are brought in contact with air in varying quantities and at variable temperatures. From investigations of the author not yet published it results that one cannot count on homogeneous and complete vaporization except if strictly the correct quantity of combustible is introduced into the volume of air necessary, and at such a temperature that the combustible is instantaneously vaporized. Where the carburation takes place gradually, either by splash (which is a rarity) or by the contact of the air with the liquid exposed to it in thin layers, there will be selective evaporation whenever the temperature is insufficiently high to cause instantaneous vaporization. This result is very striking when one employs substances having practically the same point of ebullition, as, for instance, alcohol of 90° and benzine. At a temperature of 20° C., for example, the benzine is carried off by preference, whatever be its proportion in the mixture. At the same time methyl alcohol and acetone are vaporized, as well as very rich ethyl alcohol. There remains, therefore, on the contact surfaces a product less volatile and containing more water than the original mixture. One must therefore not be astonished if two successive explosions do not resemble each other as to their mechanical and chemical results.

What has been said on the subject of relatively simple mixtures of denaturated alcohol and benzole applies to the most complex mixtures of denaturated alcohol, amyl alcohol and gasoline. We saw above that very small quantities of water sufficed to cause the separation of the liquid into two layers at a temperature near the freezing point; and that, on the other hand, if the evaporation in the quantity of the air drawn in is not instantaneous and complete, there is selective evaporation; the lighter constituents of the gasoline are carried off first, accompanied by very concentrated alcohol, leaving the amyl alcohol and the heavier constituents of the alcohol behind.

The investigation of the question does not seem sufficiently advanced to permit to decide which is the best carbureting agent. To the author it seems that the majority of the carbureting agents proposed so far have practically the same calorific power and the same heat of vaporization. Preference should be given to the one which is the most homogeneous and lends itself best to rapid and complete vaporization. According to his analyses ordinary gasoline does not respond to these requirements as well as benzole, owing to the frequent variation in its composition.

In connection with the utilization of carbureted alcohol there remains one important question to be resolved: What are the conditions under which are formed the acid products which are claimed in certain cases to cause the corrosion of the cylinder and exhaust valves? Sometimes these acid products are attributable to the existence of sulphurous ingredients, but it seems that under certain conditions the oxidation of the alcohol is incomplete at a relatively low temperature, 250° to 300° C. The formation of these acid products must therefore be attributed to the operation of the carburetor and to the compression of the gas in the cylinder. In no case should it be considered a sure sign of the existence of impurities in the alcohol employed. The author has made experiments in the laboratory with alcohol chemically neutral and absolutely free from aldehyde, and found that after a contact of a second of the vapors of that alcohol with air free from all acid vapors, the alcohol collected was acid and contained aldehyde as soon as a temperature of 250° was reached, which is normal in the compression chamber.

A Popular Explanation of the Principle of the Auxiliary Spark Gap.

The principle upon which is based the action of the auxiliary gap in high tension ignition circuits was fully explained in an article in The Horseless Age of February 28 last. However, for the benefit of those unfamiliar with electrical terms and phraseology we reproduce from *Der Motorwagen* the following simple explanation by means of an hydraulic analogy. Electrical phenomena are very commonly and very satisfactorily explained by analogy with more familiar hydraulic phenomena.

We will try to build an apparatus which behaves similarly as the secondary circuit of a high tension ignition apparatus. First of all we need an impelling device to set the water in motion. A pump will serve this purpose, and for the sake of simplicity an ordinary paddle wheel is inserted in a pipe, as shown in Fig. 1. The rotation of this pump wheel forces the water in one direction or the other. This paddle wheel is supposed to be set in rotation by means of any primary source of energy, preferably, in order to make the analogy more com-

r a turbine driven by a primary of water, which would correspond primary circuit of the ignition ap- This turbine serves no other ob- n to set the shaft of the paddle motion, gradually increasing that rom a standstill to a maximum and dually reducing it again to zero.

addle wheel pump is therefore the y winding of the spark coil. Its s, the ends of the pipes, are led up- d remain open at their upper ends. still have to provide the equivalent plug. For the electric current the an interruption of the circuit, with at which the insulation resistance, gap, is comparatively small, so that be bridged if the pressure is suffi- high. An analogous condition for r circuit may be obtained by insert- cross pipe a thin membrane which ly prevents water from flowing the pipe, but which is broken when er pressure is increased, and then a free flow. Such a membrane is the cross pipe in Fig. 1.

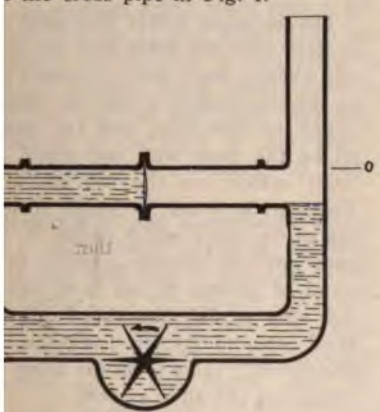


FIG. 1.

completes the circuit, and we may erve what takes place when the ap- s set in motion. The paddle wheel motion by means of the primary Previously the water stood at the el (0) in both of the vertical pipes. flows in the direction of the arrow, the left hand pipe and sinking in t hand pipe. This places the thin ne under pressure; the water col- the left hand pipe presses with its upon the water in the lower part of and this pressure is transmitted to mbrane, from the opposite side of he water has disappeared. If the of the paddle wheel is continued, r in the left hand pipe will finally point where the membrane cannot d the pressure; it bursts and allows ent to flow into the empty pipe at . We will assume that this occurs e water level has reached the di- . This operation is comparable normal operation of the spark plug. e water pressure has been equalized same level restored in both pipes, mbrane may be renewed. Of course se of the spark plug the renewal of insulation after a spark has passed ace automatically.

We will now insert in the cross circuit a sooted plug, a plug the air gap of which has been made conductive by a small shunt. This may be represented in our hydraulic system by a membrane around which the water may pass through a small pipe, as shown in Fig. 2. This small pipe represents the layer of soot. If now the paddle wheel is set in motion, the water rising in the left hand pipe will flow over to the right hand pipe through the small shunt pipe, and the water level in the left hand pipe probably never reaches the division 4. Hence the pressure on the membrane does not become strong enough to burst the membrane and the apparatus refuses to work, the lack of pressure on the membrane (plug) being the cause.

To remedy this we insert an auxiliary gap, which also consists of a membrane, just a trifle stronger than that which represents the plug. This is shown in Fig. 3. As there is now a complete membrane obstruction in the circuit, the same as in Fig. 1, and since the auxiliary membrane is supposed to be stronger than the original mem-

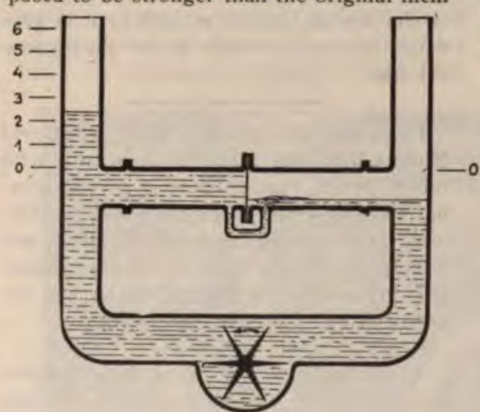


FIG. 2.

brane and will consequently stand a higher pressure, the column of water will rise beyond the division 4. We will suppose that when the water level reaches division 6 the pressure is sufficient to burst the auxiliary membrane; the current of water then flows through this auxiliary membrane and dashes with its whole force, equal to the pressure of about five divisions, against the membrane representing the plug, which is unable to withstand this pressure. Even though the small shunt pipe at once carries off a part of the water, the reduction in pressure is not sufficient to bring it below four divisions, and as with four divisions of pressure the plug membrane bursts, the water current flows directly through the cross pipe and not through the small shunt pipe.

Thus we have produced a spark at the plug by the aid of a spark at an auxiliary gap. Quite similar, although considerably faster (in about one-millionths of a second), the electric phenomena in the spark circuit take place. The auxiliary gap results in electricity being stored up, as it were, so that it suddenly flows into the sooted plug with great energy. With such an onslaught the layer of soot cannot take care of the full current with sufficient quickness, and the current takes the more difficult path through the air at the spark points and there forms a spark.

Program of Aix les Bains Events.

A series of automobile events will be held at Aix les Bains in Southern France, under the auspices of the Automobile Club of the Rhone, from June 22 to June 30 next, and the program of the events has been arranged by a meeting of a committee of the club and representatives of the Grand Cercle of Aix.

On Monday, June 22, the day after the Laffrey hill climbing contest, the tourists will start in a caravan from Grenoble and proceed to Aix by the Chartreuse road. On Tuesday, June 23, there will be a race from Chignin les Marches to Albertville and back, a distance of about 50 miles, on what is said to be the finest road for speed contests that may be found anywhere, the whole route extending along the dike of Isere, being without curves and splendidly paved. On Wednesday, June 24, there will

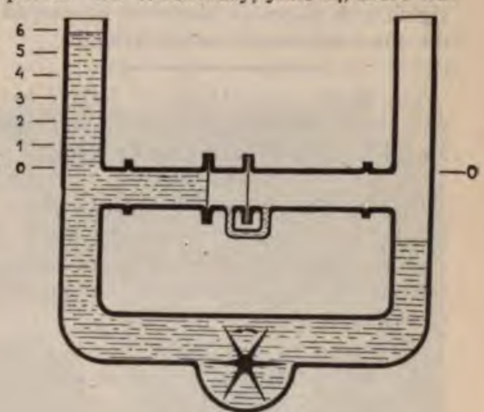


FIG. 3.

be an automobile "rally paper," which is reserved for the tourists who have taken part in the caravan trip. On Thursday, June 25, there will be a kilometre speed contest on the national highway between Chambery and Aix les Bains. On Friday, June 26, there will be an exposition of the vehicles in a building specially secured for this purpose. During this exposition there will be a competition of automobile body designs, with special reference to practicability and comfort, the designs to be judged under two heads, covered and open vehicles. Saturday, June 27, will be a day of rest to give the participants a chance to prepare themselves for the automobile parade and battle of flowers to be held the next day. In the evening the gala offered by the Grand Cercle to the automobilists and manufacturers will be given. On Sunday the automobile parade will be held in the town square of Aix les Bains, and in the evening there will be illuminations and fireworks in the gardens of the Cercle. On Monday, June 30, the automobilists will depart. Owing to the accident in the hill climbing contest at Nice, the organizing committee has thought best to suppress the hill climbing contest on the Montido Chat, the route presenting two

rather dangerous turns. The race on the Laffrey hill and that on the Mont Ventoux form a part of the fortnight, and take place immediately preceding the events at Aix les Bains, and as the grades in the hill climbing contest abandoned are less than in the last named two contests, it would not have been of particular interest and value.

New Italian Tourists' Guides.

We have received Volumes 9 and 10 of the "Guida Touristica delle Strade di Grande Comunicazione" (Tourists' Guide for the Main Highways), published by the Touring Club of Italy. Volume 9 describes five routes in Upper Italy along the coast of the Adriatic Sea, and Volume 10 the route along the Riviera from Nice, France, to Genoa, Italy. In connection with the year book or annual of the Touring Club these touring guides give very complete information for the tourist in Italy. Besides road descriptions, they give descriptions of all the important sights and places of historical interest in the cities and towns passed through.

The Motor Cycle Union of Ireland has undertaken to supply 200 road stewards for the Gordon Bennett Cup Race July 2.

The St. Petersburg and Moscow Automobile clubs have joined hands with the object of controlling in the future by affiliation all other Russian automobile clubs.

A London cabman was prosecuted by the English Motor Union for having used abusive language against Mark Mayhew, a member. The cabby was convicted and spent five days in prison and paid a 40 shilling fine.

An English firm, Peto & Radford, is making ignition accumulators with a semi-solid electrolyte, consisting of sulphate of lead mixed with a sulphuric acid solution of 1,200 specific gravity. Greater capacity is claimed than with ordinary batteries of the same weight.

The Scottish Manufacturers and Traders' Association has been founded to safeguard the interests of the industry and business of Scotland. John Stirling has been elected president and J. H. Paterson vice president. T. M. Sleigh, 1 York Buildings, Edinburgh, was appointed secretary and treasurer.

The A. C. G. B. and I. has definitely decided to organize an "Auto Cycle Club." This will be a club under the control of the Automobile Club, and members of the A. C. can become members of this club upon payment of 5 shillings. Intending members who are not members of the Automobile Club can join, after being proposed and seconded, upon payment of 1 guinea per annum.

The Bordeaux Automobile Club has decided to tar the road of the Gordon Bennett race route for about a mile before the arrival in Bordeaux and for the same distance out of the city.

The municipal authorities of Paris are organizing a competition for garbage vehicles. An order for 30 vehicles of the winning type will be given immediately upon the completion of the contest.

The Metropolitan Police Commissioners, London, have just placed an order with an English company for two 10 horse power motor cars, which will be used for official work in and around London.

The Automobile Club of Portugal will shortly occupy its new clubhouse, with which is connected a garage. The club is organizing a fuel consumption contest to be held in May. Much interest is taken in the use of alcohol as fuel, as it is produced in vast quantities in the Portuguese colonies.

For some time past the English General Post Office has made experiments with motor parcel vans. There is one at present running between London and Redhill, and another between Manchester and Liverpool. They have their advantages, it is conceded, but their adoption has not yet been definitely decided upon.

The following is the list of duties at present payable on automobiles imported into parts of British Africa: Egypt, a total of 8½ per cent. ad valorem; South African Customs Union, 20 per cent.; Transvaal, 7½ per cent. and 3 per cent. transit duties; Lagos, 10 per cent.; Sierra Leone, 10 per cent.; Gambia, 5 per cent.; Rhodesia, 20 per cent.; Gold Coast, 10 per cent.

Catalytic igniters as supplied by one or two French firms are evidently far from reliable, for we find the following from a user of such igniters in an English contemporary: "I have experimented both with and without the rheostat, and can only obtain a sensible explosion by connecting up direct to the accumulator, and cannot obtain the slightest effect from 'catalysis.' The advantages claimed are undoubtedly great if the makers can prove it to be practical. While pedaling I have obtained an explosion almost every time, but cannot get any power, or even a consistent start. I have tried the effect of boring the hole a little larger, and although I have not yet tested this fully, I think that I am on the right track. It appears to me that the construction of the plug offers too much opportunity of retaining spent gas, which would account for the erratic explosions. I think also that greater compression would be advisable if the effects of catalysis are to be properly used."

The annual meeting of the Automobile Club of Denmark was held on April 1. The club, which has now ninety-three members, is organizing a tour from Copenhagen to Stockholm in connection with the exhibition to be held in the latter city next month. In July or August an automobile tour of Denmark is to be held.

On April 7 Walter Long, chairman of the Local Government Board, in answer to a question in the British House of Commons, said that his attention had been called to the various means adopted on the Continent for the identification of motor cars and the suppression of furiously driving them. Legislation would be necessary to enable him to deal with the matter, and the subject was receiving his consideration.

The 60 horse power Mercedes cars seen at Nice were not fitted with the new clutch and change gear device recently described in the automobile press, but retained the clutch of last year, and the same seems to be the case with the speed changing lever, which has the old lateral motion. There is, however, a thumb spring at the top of the lever which opens or closes the path into the reverse motion, so that instead of having to use both hands, as in the 1902 model, the thumb of the right hand replaces the left hand for reversing. The throttle valve is on the wing principle, instead of the slide system.

During the month of March last there were imported into British ports no less than 571 motor cars and motor cycles valued at $854,440. The imports of parts during the same month amounted to $177,040, making the total value of imports $1,031,480, as compared with $473,675 in February last and $352,565 in March, 1902. Twelve cars, amounting in aggregate value to $36,850, were re-exported, and parts to the value of $10,600. The number of vehicles of British manufacture exported during the month attained 54, and their value $76,515. The total value of automobile imports for the first quarter of the year amounted to $2,239,830, or nearly three times as much as in the same period last year. These figures are certainly most interesting to American manufacturers and exporters.

In a new type of four cylinder engine designed by Herr Bugatti and built by De Dietrich & Cie, Niederbronn, Germany, each pair of cylinders is cast in one piece, but without any water jacket, and each of these castings is then enclosed in a circular aluminum casing, which forms the jacket around them; the inlet valves, the exhaust valves and the igni-

ugs are all fitted in the heads of inders. The valves are all mechani- perated, and a cam shaft lies along de of the crank chamber for oper- them, vertical pushrods guided by s extending from the jacket. The itator is placed horizontally at a omewhat higher than the cylinder nd is driven by a vertical shaft with gears. The cylinders are 4.56x5.20 and the range of engine speed is 1,400 revolutions per minute.

lish Gordon Bennett Team Completed.

third member of the team to repre- e A. C. G. B. and I. in the coming Bennett Cup Race, was selected on ay, April 25, by speed trials on the ood Hill. Dashwood Hill presents straight course with an average e of 6⅔ per cent. The conditions which the third representative was chosen were as follows: The time would be occupied in traveling 12 t an average speed made over a fly- ometre both up and down; the time would be occupied in traveling 3 at an average speed made over a g mile both up and down; the time would be occupied in traveling 1 an average speed made on three ys up hill.

timekeepers and competitors assem- ate on Saturday night at Banbury. llowing took part in the trials: C. S. (Napier), J. W. Stocks (Napier), Mayhew (Napier) and J. Lisle . The trials were made according gram, and it was found that Mr. made the best time for the 16 miles, Mr. Rolls by 5 1-5 seconds, Mr. w by 2 minutes and 19 seconds, and sle by 3 minutes and 22 seconds. All nembers of the British team (S. F. Chas. Jarrott and J. W. Stocks) will re drive Napier cars.

tor Cars and the Application of nical Power to Road Vehicles" is the f a book of which Rhys Jenkins is thor. Mr. Jenkins gives the names the leading makers of motor cars to- ith descriptions of their machinery, iscusses the question of pneumatic The author has carefully studied all ny sides of his subject, and presents ults of his study in a historical and phical manner.

n automobile driven by steam, the ature of the steam must be uniformly as is practicable without injury to ve, pistons or cylinders. More of these ons are to be found in the multiple boiler than in any other style. the greatest problems to solve was uring of steam free from entrained re from a boiler full of half-inch with only 6 inches or less of steam bove the water for the steam to free

..COMMUNICATIONS..

A Dust Protector for Tonneau Cars

PASADENA, Cal., April 17.

Editor HORSELESS AGE:

In your issue of April 8, page 459, I notice an inquiry from C. R. Hoag on "The Dust Nuisance," and a partial description of a dust protector by the editor, stating that the design of screen mentioned is more suited to a surrey body than to a tonneau with rear entrance. I beg to call your attention to my article on "The Redlands Run of the Pasadena Automobile Club," published in your issue of January 28 last, in which I described the dust protector which I have used with great success on my car ever since I began running it. It is an almost absolute preventative of dust from behind, and I have found it particularly useful out here in California, where we often encounter long stretches of adobe and alkali dust while making long tours. I enclose photographs of this dust protector fitted on my machine, which, if you reproduce it, may prove of some assistance to your readers. When it is desired to open the tonneau door, the rod on either side is simply unhooked. This device was made for me by Studebaker Brothers Manufacturing Company, in Chicago.

TRACY C. DRAKE.

Interested in American Automobiles.

LONDON, April 17.

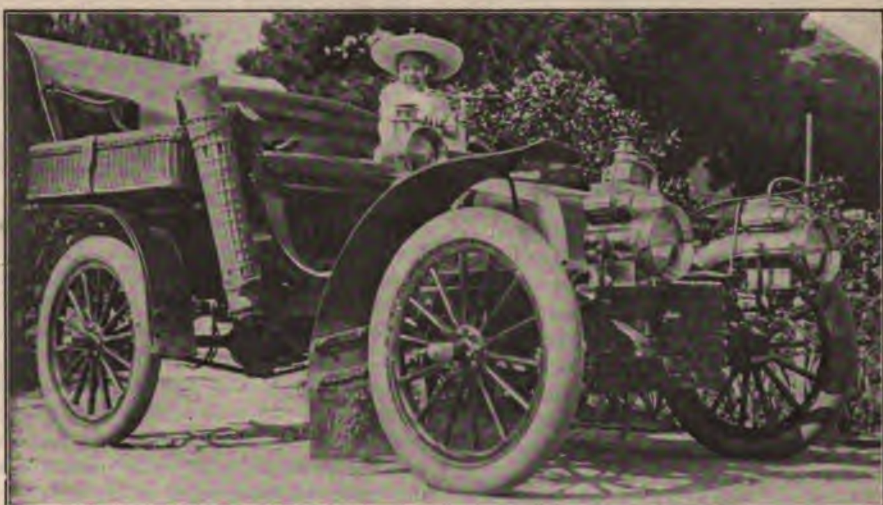
Editor HORSELESS AGE:

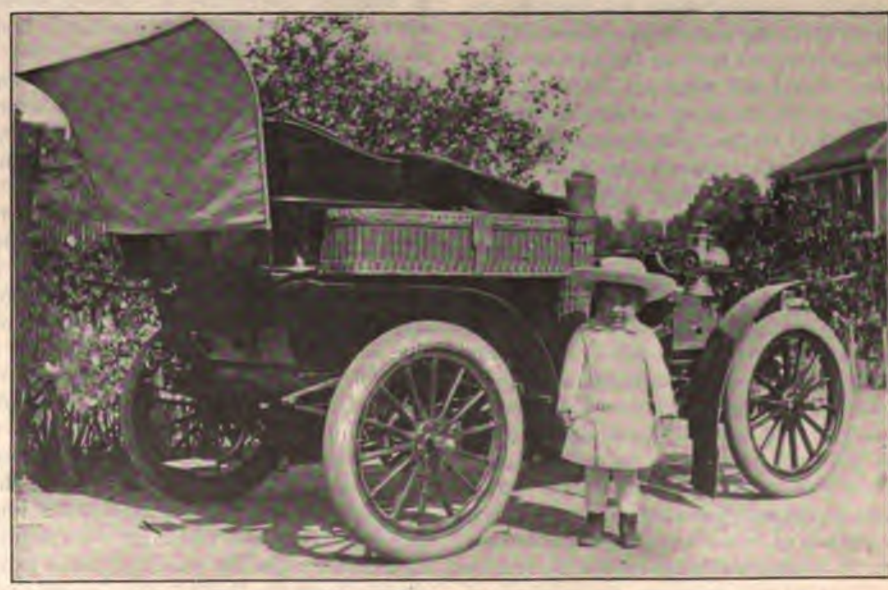
I shall be greatly indebted to you if you will be good enough to have sent to me a complete catalogue of the late Automobile Exhibition in New York.

I am greatly interested in the American automobile development, and am looking out for cars of American manufacture which may be suited to this country.

In addition I should be greatly obliged if you could also inform me as to where I can obtain further catalogues of any automobile shows of importance in your country.

I am a subscriber to your valuable and very comprehensive paper, THE HORSE-





DUST PROTECTOR FOR TONNEAUS.

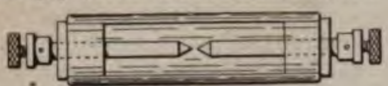
LESS AGE, and it is from this that I have been able to inform myself as to the growing importance and extension of the American automobile trade.

JOHN PULLMAN,
E. S.

A Home Made Spark Gap Device.

Editor HORSELESS AGE:

The enclosed sketch shows a simple spark gap device which I made myself. It



consists of a glass tube, 2 inches long, cut from a water gauge glass, with corks forced into both ends, through which pass two brass screws with platinum points. The brass screws are from an old Erickson telephone transmitter. The device is made very cheaply and works perfectly.

W. N. FOWLER.

On a Detail of a Cooling Problem.

Editor HORSELESS AGE:

In a recent article in your journal by Albert L. Clough the question of air cooling of gasoline motors is referred to as follows:

"Air Cooled Motors.—These served very well in the smaller sizes, but when more powerful vehicles were called for and motors of larger bore became necessary the limiting size was soon reached and passed."

So far Mr. Clough is quite right, but then he continues:

"The fact that the energy dissipated in the cylinder increases as the square of the bore, while the radiative and convective ability of the cylinders increases only as the first power of the bore, imposes such discouraging conditions that it is no wonder that in the absence of much experience in multi-cylinder construction air cooling was abandoned in favor of water circulation."

Mr. Clough's history is all right and generally his logic also, but here he assumes that the energy dissipated in the form of heat increases as the square of the bore. May I ask why?

Heat from the gases inside the cylinder is dissipated to the walls of the cylinder by convection and radiation; in other words, in exactly the same way and according to the same laws that it is dissipated from the outside of the cylinder wall to the surrounding air. We must therefore compare the inside and the outside surfaces of the cylinder wall, and the ratio between the two may be varied at will. It is only necessary to make the cylinder walls thick enough to obtain any amount of cooling surface desired. We all know that in practice it is not practicable to go beyond a certain thickness of metal, as that would result in too much weight, although this is the method of heat dissipation used in some form of automatic rapid fire guns. To sum up this part of the question, the cooling of the cylinder walls can be taken care of by using the proper thickness of metal in the walls, and gills or pins of sufficient radiating surface. Many when first approaching this subject assume that the less metal there is in the cylinder wall the more rapidly the heat will escape. This is not correct, because iron is a better conductor of heat than air, and a cylinder wall of ample thickness will keep cooler than a thin wall, other things being equal.

Mr. Clough is quite correct in his history, however, and it is quite true that air cooled motors took a back seat for a time at least. I think we will find the cause for the failures in many cases to be connected with the cooling of the exhaust valve passages on both sides of the valve proper. The cooling facilities of this part of the engine are much less effective in a large than in a small engine. Let us take as an example two similar engines, one of three times the linear dimensions of the other (I avoid the ratio two because the sum of two and two is equal to the square of two, and the results would therefore be capable of two different interpretations). Here we have a cylinder with twenty-seven times the volume of the other, and the exhaust valve passages have only nine times the area in the larger as in the smaller engine. In consequence three times the amount of hot gases will pass per unit of area of the exhaust passage in the large engine, and the exhaust valve and passages will be subjected to a much greater heating effect.

This, then, is the point to which attention should be given, and upon which invention should be concentrated. To back up my position, let me cite an example of practice. Note the very good operation of air cooled cylinders with a water cooled head—the exhaust valve is located in the head. Also note on an air cooled motor using radiating pins that the pins on the cylinder are covered with oil and dust; those nearer the exhaust valve are blue and dry from the heat, while those around the valve, on both sides of the latter, are so hot that they have all turned brown with rust. They apparently attain a temperature of nearly 1,000° Fahr.

I would also call attention to the tendency to reduce the length of the water jacket and confine it almost entirely to the valve chamber, which is observed on many modern machines.

Now, just one more suggestion before I close this letter. When you examine the exhaust pipe of an engine you will find it rusty, and near the valve the rust is quite deep. At night this part of the exhaust pipe is almost a bright red. Here is a mass of metal at a very high temperature which is fastened to the part of the motor that is most difficult to cool. This pipe is commonly screwed into the cylinder head and runs close to the wall or head of the cylinder. Why not put a non-conducting gasket between the pipe and the cylinder head, and also let the gases get away from contact with the head immediately after they pass the exhaust valve? By concentrating our efforts upon the worst point we will lose less water and waste less energy, for we know that the less cooling is done the better it is, so long as we avoid premature ignition, reduction of charge and faulty lubrication.

DR. HENRY POWER.

Graphite Lubrication

Editor HORSELESS AGE:

Our attention is called to THE HORSELESS AGE of April 8, page 457, whereon there is an article entitled "Graphite Lubrication," by F. Hiorth, of Christiania, Norway. The article is especially interesting to us in that it advocates graphite lubrication, something which we have been fighting for during the last score of years. We are also pleased to say that much attention is now being given to mechanical lubricators, especially that type which feeds by some reciprocating part only when the engine is in motion. Such lubrication makes it unnecessary to do more than see that the lubricator is properly supplied with oil and graphite.

In spite of all the many attempts that have been made to suspend graphite permanently in oil none has succeeded that we know of, further than to cause the graphite to be suspended for a short time, and that only by the use of an oil of high viscosity. Therefore, it is necessary for the best results that the lubricator should, like the one mentioned in THE HORSELESS AGE, be one that mechanically agitates the mixture, thus insuring an even distribution of the graphite throughout the mass of oil.

On an 80 horse power Corliss engine we have been experimenting for the past six months or more with the Hills-McCanna graphite lubricator and with marked success and satisfaction and economy. Like the foreign lubricator, it mechanically agitates the mixture of graphite and oil.

There are now made in the United States quite a number of lubricators suitable for most excellent results in graphite lubrication.

So far as the lubrication of automobiles is concerned it is not necessary to call upon an expert to learn that altogether too little attention has been given to proper lubrication. In some makes of automobiles the very selfsame oil is used for lubricating cylinders and bearings. That is, from a common lubricator pipes are led to cylinders and bearings. This in itself does not seem to be a good practice, and if graphite is used in such lubricators there is a liability of the pipes becoming so clogged that there would be no feeding, and possibly great difficulty in removing the clogged graphite. Even in some automobiles with so called force feed lubrication, it is doubtful if the force is sufficient always to carry any mixture of oil and graphite.

For steam carriages a small hand oil pump is used with great satisfaction, an injection of graphite and oil being given whenever the engine seems to specially call for it, usually on up grades or heavy roads. The experienced driver usually can tell, al-

intuition, when the engine requires f graphite. Graphite lubrication is valuable where superheated steam s in the case of the White machine. , unlike oil, is not at all affected by se heat of superheated steam.
riter knows of cases where the il pump has been used with great on in steam automobile lubrication, e would seem to be no good reason same pump should not be used for ng graphite into the cylinders of ine engine.
hief reason for the most excellent here graphite is used is that given Hiorth when he discovered that flake graphite had filled all the the cylinder walls. If a microscope on even the smoothest surface ut by man, it will be discovered that aces are full of microscopical in- s. The pure flake graphite so fills egularities that there is a veneer ting of marvelous smoothness and e.

SEPH DIXON CRUCIBLE COMPANY,
Geo. E. Long.

of the Auxiliary Gap on the Spark.

IORSELESS AGE:
been much interested in what has in your columns regarding the spark gap, but there is one point I would like a little more informa-

peak of the auxiliary gap intensify- spark. In some experiments that I n making I find that with the same coil and spark plug the heat of a t would set paper or a dry shaving hout the gap would hardly scorch paper when the auxiliary gap was should like to know if this is al- result of the auxiliary gap. If so, almost think that the loss of heat park would be a strong argument the employment of the auxiliary

ou or your readers give me some this point, and oblige?
W. D. WOOLSON.

r normal conditions, when the g is clean, the auxiliary gap has of reducing the heat of the spark, s to the resistance of the ignition It only intensifies the spark when is sooted. If the battery power e insufficient to give reliable igni- n there is an auxiliary spark gap the terminals of the latter can be together and the gap thus closed, most devices that have been placed arket can be done by giving a ma- ew forming one of the terminals r so.
nection with the experiment you it should be remembered that a oduced inside the cylinder during ion is naturally much smaller than in the atmosphere produced by the paratus, and the weakening effect of the auxiliary gap on a spark in the cylinder is also much less than the effect on an atmospheric spark.

No satisfactory name has yet been suggested for the devices placed upon the market providing the auxiliary gap. "Intensifier" is a misnomer, and to call them simply "spark gap," as some do, is as illogical as it would be to call a door lock a key hole. We have been using the term spark gap device, but consider it rather long for practical use.—ED.]

Legislative Animosity to Motor Bicycles.

Editor HORSELESS AGE:

I enclose a clipping from the Springfield *Union* regarding motor cycle restrictions.

Some of the recently proposed regulations are certainly outrageous. It has been my experience that motor cycles do not, as a rule, scare horses, since the latter have long ago become accustomed to ordinary bicycles, and yet it seems that in certain localities there is open discussion as to the advisability of prohibiting the operation of motor cycles *altogether*. Should a man be required to pay taxes for the maintenance of roads which he is not permitted to use?

It is time for all the motor cycle clubs throughout the country to join hands in a common effort to secure decent recognition.

L. E. FRENCH.

Spring Pump for Feeding Flash Boilers.

Editor HORSELESS AGE:

Last year I put on my steam carriage a spring actuated gasoline pump, with plug plunger, no packing, and enclosed in a barrel with overflow; in fact, the same pump that has been described in the "Beginners Page" of THE HORSELESS AGE. This is to my mind the best method of pumping gasoline against pressure, as the device has never failed me and never required any attention. Whether it was set to pump gasoline at 30 pounds or 100 pounds pressure it never failed to keep the pressure at that point as it is regulated by the compression of the spring. It has never required any attention; in short, its performance has been perfect.

Now, I am going to ask you if a pump or two pumps of the same design could be made large enough and provided with springs strong enough to feed a flash boiler and do away with the by-pass valve?

Two of these pumps working alternately on the same rocker would feed a steady stream of water to the boiler as soon as the fall of pressure would demand it, no matter how slow the engine might be revolving, and would prevent the sudden jumps of pressure that interfere with the smooth running of the engine. They would also do away with the hand pump, as either of the two pumps could be worked with a suitable handle for the start or for any emergency. And last, but not least, it would do away with the packing. Maybe there are users who are not experts, but who can make pretty good pump packing, but sometimes it is so loose that it leaks, or sometimes it is so tight that it absorbs more power than the pump has to work against.

ERNEST DUVAL, M. D.

[The idea seems quite practicable to us. Water must be pumped to the boiler from eight to ten times faster than gasoline, and two pumps of double the bore and of the same stroke as the gasoline pump would seem to be sufficient in size. The experiment is certainly worth a trial.—ED.]

A Balky Cycle Motor.

Editor HORSELESS AGE:

I have recently come into possession of a "Trimoto," the three wheeler manufactured by the American Bicycle Company. As you know, the motor and gears are mounted upon the front wheel. The catalogue of the company, when this vehicle was put upon the market, set forth that the ignition was by hot tube. The carburetor was described as being divided into two compartments, the larger one holding a gallon and a half of gasoline, through which air was passed to form gas for the engine. The other compartment, holding 1 quart of gasoline, for feeding the burner, was kept under air pressure by a small pump. The tank containing the lubricating oil was attached to the back of the carburetor, and kept under air pressure to insure automatic feed.

I understand that after this catalogue was issued electric ignition was substituted for hot tube.

The Trimoto which I have has electric ignition, but the original carburetor seems to have been retained. There is a pump in the rear compartment for the oil feed, and in the front a pump to get up pressure for the hot tube.

In turning the flywheel I have been able to get only one or two explosions. Removing the spark plug and placing it on the cylinder I get a spark. I am using two dry batteries. The compression seems good, but the motor turns hard. Whether the fault is with the surface carburetor or not I cannot understand. Beyond the occasional explosion I can get nothing. Whether the two batteries are insufficient or the fault lies elsewhere I am unable to decide. I will be greatly indebted to you or any of your readers who may have knowledge of the Trimoto for any pointers. I would like to know also what the horse power of the Trimoto was assumed to be.

HORSELESS AGE SCHOLAR.

[Very likely your spark is not hot enough and you need more battery power. We shall be glad to publish any other suggestion from users of this type of machine.—ED.]

MINOR MENTION

The Auburn (Ind.) Automobile Company have one automobile being tested.

Charles F. Grout, Worcester, Mass., has secured the agency for the Hoffman automobile.

The Model Gas Engine Company, of Auburn, Ind., will soon have their first rig running.

Up to April 20, 1,056 licenses, at $1 each, had been issued by the Secretary of State of New Jersey.

The American Darracq Automobile Company have opened a Philadelphia office at 262 North Broad street.

The Auburn (Ind.) Bicycle Works are building a touring car for a local physician, and a company may be formed to build more.

The Country Club Car Company will engage extensively in the manufacture of automobiles and gasoline engines at South Boston, Mass.

Marsh Brothers, of Brockton, Mass., are looking over a large building at Pawtucket, R. I., with the object of using it as an automobile factory.

The Owosso Carriage Company, Owosso, Mich., are building a light runabout, propelled by a two cycle motor, designed by C. P. Malcolm.

The first automobile station at Germantown, Pa., will soon be erected in Main street, below Washington lane. Its dimensions will be 75x30 feet and three stories in height.

Francis E. Stanley spoke before the Society of Arts of the M. I. T., Boston, on April 23 on "Some Problems to be Solved in the Building of the Perfect Steam Propelled Automobile."

On May 2 the Standard Anti-Friction Company, New York, will remove to 144 West Thirty-ninth street, where special attention will be given to applying "Be-noca" tire to automobiles.

President Milton J. Budlong, of the National Association of Automobile Manufacturers, has been elected president of the Electric Vehicle Company to succeed George H. Day, resigned.

The New York City Board of Estimate has approved a request from Street Cleaning Commissioner Woodbury for a new four seated gasoline automobile to be used in the work of the department.

The plant of the Kidder Motor Vehicle Company, New Haven, Conn., has been taken over by John H. Springer, of New York, who purposes to immediately begin the manufacture of automobiles.

O. W. Kelly, of Springfield, Ohio, recently tested a new motor truck of his invention, which is reported to have proved satisfactory. Secretary Elliott, of Porto Rico, is said to have ordered twenty-five of the trucks and twenty-five passenger automobiles for shipment to Porto Rico.

The New York Association of Automobile Clubs was formed at Syracuse on April 25.

It is reported that the removal of the Standard Pneumatic Tool Company from Aurora, N. Y., was for the purpose of consolidating with the plant at Cleveland, and beginning the manufacture of automobiles in the near future.

R. R. Ross informs us that his Packard car in the Boston hill climbing contest was wrongly classed, owing to the lateness of entry. It weighs 2,200 pounds and should have been in the class of 2,000 pounds and over, which would have placed it second in its class.

A test of the availability of automobiles for carrying the mails between Knoxville and Sevierville, Tenn., is soon to be made by Cowan Rodgers in a machine of which he is one of the makers. He will be accompanied by the contractors and one of the postal officials.

Eli Stewart, a New Jersey traveler, is reported to have ridden more than 18,000 miles on his Thomas Auto-Bi without more expense in the way of repairs and replacements than would have been the case had he used the ordinary bicycle, and will continue to use the same machine during this year.

Plans are being considered for organizing a company to establish an automobile line between Knoxville and Fountain City, Tenn. A meeting was called by S. H. George, M. S. McCullen, John Hope, Jim Anderson, E. F. Mynatt, S. B. Waggoner, T. T. McMillan and others, to be held on April 23, at 613 Prince street, Knoxville.

C. G. K. Billings has bought the new automobile stable at 172 East Seventy-fifth street, New York. It is three stories in height, with fronts of Harvard brick, each one standing on a lot about 20x100 feet. Inside they are luxuriously fitted up and contain on the upper floors a living room, a dining room, a small kitchen and a billiard room.

Automobile Accidents.

The imported gasoline touring car of Frank A. Munsey, New York, was damaged by fire in Central Park on April 23.

A motor truck belonging to the Johnson Service Company, Milwaukee, Wis., was considerably damaged by fire on April 16.

On April 23 Dr. Willard Parker, of New York, had his leg broken by an automobile owned by Smith & Mabley and driven by Alfred Peron. Peron was arrested, but bail was given by the firm for his appearance for trial.

The gasoline runabout of Mr. and Mrs. W. A. Journeay, Lodi, Cal., was overturned by colliding with a drove of pigs and the occupants were considerably bruised.

LEGISLATIVE AND LEGAL.

The Crusade Against the Doughty-Bailey Bill.

The Board of Governors of the Automobile Club of America held a meeting last Friday to consider the Doughty-Bailey bill, which is before Governor Odell for approval. They were in session a long time, as there were many points to consider, from the fact that the automobile trade and users of the whole State are against the measure, and there is now being organized a combination of all interested in automobiles, aside from the officials of the club, in a movement to go before the Governor and protest, with a view of having the measure killed.

All that could be learned about the action taken at the meeting was given out in the form of a resolution that set forth that the club had approved the bill while in course of passage, because it was thought to be the best obtainable at this time, and that next year an effort will be made to have the objectionable features eliminated and replaced by more liberal provisions.

The opposition of many members of the Automobile Club of America to the Doughty-Bailey bill, which is before Governor Odell for approval, has taken shape in the form of a petition to which many signatures are being attached. The petition calls for a general meeting of the club on Saturday evening for the purpose of discussing the bill. Those who started the petition seek to arrange some plan whereby the former position of the club in support of the measure will be abandoned and the organization's effort to defeat the measure be added to that being made by the other opponents who have protested or are about to protest to the Governor.

President Budlong, of the National Association of Automobile Manufacturers, has been in communication with the Governor and has received his assurance that the bill will not be signed until that body is heard from in protest. A committee will call upon the Governor after his return from St. Louis and present arguments against the signing of the bill.

Numerous protests against the Bailey Automobile Bill, recently passed by the Senate of the New York Legislature, have been filed with the Executive Chamber, and Governor Odell has decided to give a hearing to the protestants on May 6 at 3 p. m. Among the protests received is one from the New York State Association of Automobile Clubs at Syracuse, which protests upon the ground that the Bailey bill is a compromise between the legislation desired by the A. C. A. and that desired by

inhabitants of Long Island, and does not in any way take account of the wishes of majority of the people of New York State. Dr. W. E. Millbank is president of the New York State Association of Automobile Clubs.

The Minnesota House Judiciary Committee's bill regulating the speed of automobiles has been recommended for passage.

The suit of E. B. Haines, of Paterson, N. J., vs. the United States Long Distance Automobile Company has been settled out of court.

T. C. Havemeyer, of New York, has brought suit for $7,000 against the city for injuries caused to his automobile by falling into a deep street excavation.

J. T. A. Doolittle has been appointed referee in the matter of the voluntary dissolution of the New Hartford Machine Company, and a meeting will be held at his office, Utica, N. Y., on June 8.

The Friedman Automobile Company has brought suit in the Superior Court at Chicago against the National Sewing Machine Company for $100,000 damages for the alleged violation of a contract to furnish automobiles to the plaintiff.

Mrs. Lottie Davey has been appointed guardian of her son, William M. Davey, for the purpose of bringing suit against George M. Barnes, of Syracuse, N. Y., for injuries said to have been sustained by her son by being run over by defendant's automobile.

Councilman Crall, of Indianapolis, Ind., will introduce an ordinance restricting the speed of automobiles and providing that each machine shall bear a number large enough to be read when going at high speed, and for the issuance of the number placards by the city comptroller.

L. A. Hall, of the National Capital Automobile Club, Washington, D. C., has made formal application to the District Commissioners for a license to operate an automobile under any new regulations that may be adopted. He requests that his application be numbered "No. 1."

The Minnesota Senate on April 20 passed under suspension of the rules the House Judiciary Committee's bill regulating the speed of automobiles. The bill makes it unlawful to go faster than 8 miles an hour in the thickly settled portions of a city or village, 25 miles an hour in country districts, and 4 miles an hour over a crossing, and requires that automobiles be supplied with lamps during hours of darkness and with bells or horns at all times.

The Eisenhuth Horseless Vehicle Company, Middletown, Conn., have mailed a circular to bondholders, stating that the parties who stand ready to furnish the capital to place its factory in full operation have made the company a proposition that if the bondholders will accept first preferred 6 per cent. stock at par for their bonds the parties will pay spot cash for the balance of the first preferred stock issue at par to the treasury of the company, thereby providing the necessary working capital.

A movement is on foot at Cambridge, Md., to invoke the aid of the Town Council in prohibiting the use of automobiles on the streets.

G. Motti, of Union Hill, N. J., purposes to sue the town for damages recently done to his automobile by the defective condition of Kossuth street.

A. G. Vanderbilt, of New York, has brought civil and criminal suits against St. John Wood on the charge of carelessness by his chauffeur in running down the coach Pioneer on March 27.

The Connecticut automobile bill was recalled from the office of the engrossing clerk on April 17 and was submitted by Mr. Ford, of Washington, who offered an amendment providing that automobiles shall be registered on or before July 1 next, and that descriptions of the automobiles shall be made on blanks to be furnished by the Secretary of State. The House adopted the amendments and passed the bill, but subsequently, on Mr. Hubbard's motion, reconsidered and tabled.

A. C. A. Affairs.

The spring parade under the auspices of the Automobile Club of America will be held Friday. This was decided upon by the club's committee on runs and tours last Friday. None of the details were made public, but it was said that a large number of wagons would be in line, as much interest has been manifested. The route will be from Washington square, up Fifth avenue to Riverside Drive, to the Claremont and back again to the Plaza at Fifty-ninth street.—Just before going to press the event was declared off.

New York Automobile Trade Association.

The New York Automobile Trade Association perfected its organization last Friday night, when the executive committee of fifteen, which was elected a week before, met and elected officers. Percy Owen was chosen president, George B. Adams first vice president, Allen Whiting second vice president and John J. Plummer, secretary and treasurer.

R. A. Green, C. R. Mabley and Benjamin C. Barry were appointed a committee to take up the chauffeur question. They will work in conjunction with similar committees appointed by other organizations.

A committee on membership was appointed, with the following members: C. R. Mabley, R. M. Owen and Frank Eveland.

Secretary Plummer was instructed to write to Governor Odell protesting against approval of the Doughty-Bailey bill, and asking that no action be taken until the new organization can be heard.

New Corporations.

Duquesne Motor Car Company, Buffalo, N. Y.; capital, $50,000; directors, A. H. Howe, H. G. Johnson and Leroy Pelletier, all of Buffalo.

The Stamford Automobile Company, of Stamford, N. Y.; capital, $5,000; directors, G. W. Kendall, J. A. Tooley and C. R. Clark, all of Stamford.

The Automobile Company of New Jersey, Jersey City; capital, $100,000; incorporators, Harry H. Picking, Gardner W. Kimball and Charles A. Greene.

Royal Automobile Company, Jersey City, N. J., to manufacture motor vehicles; capital, $250,000; incorporators, Louis B. Dailey, Warren N. Akers and K. K. McLaren.

American Platinum Works, Newark, N. J.; capital, $70,000; incorporators, Charles Encelhard and Lyman E. Warren, of New York; Theodore Koch, of Newark, N. J.

The Ohio Automobile Machine Company, of Oberlin, capital stock $40,000; incorporators, Phil E. Milsen, A. G. Shearman, William O. Bunee, T. H. Rowland and A. B. Spear.

Rockaway Automobile Company, Rockaway, N. Y., to manufacture automobiles; capital, $250,000; incorporators, Sidney Aronstein and Henry D. Williams, of New York, and Robert Perkins, of Rockaway, N. J.

United States Auto-Motor Company, Providence, R. I., to make motor vehicles, etc.; capital stock, $90,000; incorporators, Frank Mossberg and Homer M. Daggett, Jr., of Attleboro, and Walter H. Barney, of Providence.

The Auto Machine and Repair Company, Wilkesbarre, Pa., to manufacture automobiles and parts. The company are also agents for the Stevens-Duryea, Northern and Thomas Auto-Bi. The manager is C. L. Davis.

The Jones Cycle and Automobile Company, Portland, Ind.; capital, $2,500; incorporators, F. Bimel, J. A. Richardson, Will Detamore, S. H. Adams, L. G. Holmes, A. V. Jones, J. A. M. Adair, E. M. Haynes, J. A. Jaqua, R. H. Hartford, Byron Jones, E. S. McGriff and C. D. Ames.

The Clarkmobile Company, Lansing, Mich., with a capital of $50,000; A. C. Stebbins, president; H. E. Thomas, vice president; F. G. Clark, secretary, treasurer and general manager; W. H. Newbrough, G. W. Knapp, C. D. Woodbury and H. D. Luce, all of whom constitute the board of directors.

The automobile has found a new way of killing people. M. Laumonier and his assistant, of Paris, went to clean a machine. Soon afterward both were found dead, supposedly from fumes of acetylene gas from the lantern, the valve of which had been accidentally left open.

Club Notes.

The Dayton (Ohio) Automobile Club had their first run of the season to Osborn on April 16.

The Automobile Club of Maine, Portland, on April 24 gave a banquet and testimonial to the retiring secretary, Charles P. Hatch.

The Cleveland (Ohio) Automobile Club gave a smoker at the Hollenden Hotel on April 27. Mayor Johnson was one of the speakers.

The Chicago Automobile Club has suspended A. C. Barker for disregarding the law regulating the use of automobiles, and has also recommended that his license be nullified for thirty days by the authorities.

The Bloomington (Ill.) Automobile Club has elected permanent officers as follows: President, S. P. Irwin; vice president, Howard Humphreys; secretary, Henry Throbo; treasurer, Charles Dietz; road captain, C. T. Stevenson; assistant road captain, Jeff Crawford. Directors—The president, the secretary, W. K. Bracken, Dr. J. W. Hall, I. L. Ide, C. C. Marten and Charles Cooper. Annual meeting will be held on the third Tuesday of April; quarterly meetings on the third Tuesday of July, October and January of each year.

Notices have been prepared by the Minneapolis (Minn.) Automobile Club to be sent to members against whom first complaints may be made for fast or reckless driving. They state that second complaints will be referred to the board of trustees and that if third complaints are made members may be expelled from the club; that the club rule will be strictly enforced and call upon members to use extreme care in future, especially in the downtown districts. It is said that in addition the names of members expelled will be published in the newspapers.

A meeting was held at Rochester, N. Y., on April 20, for the purpose of reorganizing the Rochester Automobile Club. Fifty new members were elected. It was decided to incorporate, and a committee on incorporation and bylaws was appointed, as follows: H. S. Woodworth, D. M. Cooper, C. F. Garfield, Lee Richmond, Dr. C. A. Huber and W. S. Morris. The committee appointed to select quarters for the club and report at an adjourned meeting, to be held at the call of the incorporation committee, are F. H. Bettys, George H. Foster and Harry W. Carlton.

The Fort Wayne (Ind.) Automobile Club was organized on April 16, with the following officers: President, Will Peltier; vice president, D. B. Ninde; secretary, L. A. Randall; treasurer, Harry Meyer. Committees were appointed as follows: Constitution and bylaws, D. B. Ninde, W. M. Griffin, A. C. Alter; legislation and good roads, Drs. A. E. Bulson, L. P. Drayer, J. E. McOscar, Wright Dodez and D. B. Ninde; house and entertainment, Peter Benson and Barney O'Connor; runs and racing, William Bostick, Fred. Hoffman, L. B. Davis, Dr. G. A. Ross and Thomas Baxter.

Some Notes on the Superheating of Steam.

Superheating conduces to economy by preventing initial condensation in the cylinder. To obtain full benefit the steam should be raised to a temperature of 650° to 700° Fahr.; but this temperature necessitates special constructive care in the engine and boiler arrangements, for at this temperature ordinary gun metal and copper become seriously weakened, and hence cannot be employed in the construction of fittings or steam pipes. Greater provision has also to be made for expansion and contraction, and greater care exercised in the design of steam chests and valves. Ribbed valves generally are liable to warp and leak. For the use of highly superheated steam, piston valves, or simple slide valves, are most suitable, and they should be as short as possible. Double beat valves are also suitable, but they should be positively driven to prevent risk of sticking, and not depend simply on a spring for closing. The lubrication also requires special attention, as ordinary cylinder oils are useless at a temperature of 700° Fahr.

It is well to remember that with highly superheated steam very high boiler pressures are not so necessary; 160 pounds would appear to be ample, and two stage expansion all that is requisite, except in the case of large engines where triple expansion may be desirable for more even distribution of power among the cylinders. The advantages of superheating are proportionately greater in low pressures than in high ones. Experience shows that without using highly superheated steam—for which existing engines, as a rule, are not suitably constructed on account of the objections referred to above—considerable economy can be realized with existing plants by superheating to a moderate extent—say 100° above the saturated steam temperature. Such a degree of heat, although not sufficient to entirely prevent initial condensation, materially reduces it, and is also specially advantageous when there are long lengths of steam pipes, as it prevents condensation, and enables dry steam to be delivered to the engines. Moderate superheating of this kind will in many cases permit of an economy of 10 to 12 per cent.

With highly superheated steam, i. e., steam heated, say, to a temperature of 650° to 700° Fahr., the reduction in steam consumption is much greater than this, but its use, as already stated, means engines properly designed for the purpose. Trials by Professor Schröter with a triple expansion engine, using 12 pounds of saturated steam, showed a saving of 18 per cent. in the steam consumption with superheated steam, at a temperature of 500° Fahr. Mr. Lenke, in a paper before the Institute of Mechanical Engineers last year, gives the following as the comparative saving in steam consumption that may be effected by using highly superheated steam (650° to 700° Fahr.) in various types of engines:

Type of Engine.	Pressure. Pounds.	Steam per I. H. P. per Hour	
		Saturated. Pounds.	Superheated. Pounds.
Single cylinder non-condensing........	......	15 to 18	14 to 16
Single cylinder condensing..........	90 to 100	19 to 25	13½ to 15
Two cylinder compound condensing	140	......	8.5 to 10

In practice trouble may be caused unless care is taken to prevent the superheating becoming excessive. As an illustration of this, Mr. Todd in the course of the discussion on Mr. Lenke's paper quotes cases where the temperature exceeded 1,000° Fahr., and caused the superheater to get in a leaky and dangerous condition. Pellets of fused iron oxide formed in the tubes, which seemed to show that the steam, or a portion of it, at this temperature "had reached the point of dissociation, and that the oxygen had attacked the tubes." It is the risk of trouble on account of the excessive heating, coupled with the fact that superheating makes the steam pipe and valve arrangements more complex, which prevents superheating being more extensively adopted. Superheating certainly requires more intelligent supervision. Some forms of superheater are designed so that they can be flooded to prevent risk of the tubes burning when the superheater is not in use, as when raising steam.

The question of heating surface necessary to give a certain result in the way of superheating is one of considerable importance to the constructional engineer. In order to obtain superheated steam at a temperature of 600° to 700° Fahr. the superheater should be heated with gases at a temperature of 1,000° to 1,200° Fahr. Michael Longridge states that if the difference between the temperature of the gases and the temperature of the steam in the superheater is 450° to 500° Fahr., the quantity of heat transmitted per square foot of heating surface per hour is about 6 thermal units for each degree difference of temperature. For example: If the gases are 1,000° Fahr. in temperature and the superheated steam is 600° Fahr., each square foot of superheater surface will transmit 6 × (1,000—600) = 3,000 thermal units per hour. This serves as a basis for designing the area of surface required for superheating a given quantity of steam.

Example: A boiler is generating 60 pounds of steam per hour at a pressure of 120 pounds (i. e., 135 pounds absolute, the temperature being 350° Fahr.). What must be the area of the heating surface of the

heater so that the steam may be su-
ated to 600°, the heating gases being
Fahr.?
: steam will have to be raised 600—
250° Fahr., and the heat required
ie, taking specific heat of superheated
at constant pressure as being .475,
50 × .475 = 7100 B. T. U. per hour. As
square foot will, with these differences
nperature, transmit 3,000 B. T. U. per
therefore 7100 ÷ 3000 = 2.37 square
rea required.

: specific heat of superheated steam at
int pressure is usually assumed to be
int, and taken as = .475. J. H. Grind-
owever, in a paper communicated to
oyal Society has shown that it varies
icreases as the temperature rises. He
: Mean value specific heat between 230°
46° Fahr. = .4317; mean value specific
between 295° and 311° Fahr. = .6482.
he value .6482 be taken in the calcu-
above, instead of .475 the area would
4 square feet. The difference is con-
ble, and the point should be noted in
heater designs. Grindley's investiga-
vould seem to show that a still higher
than .648 should be used in the ex-
taken.

he difference in head of temperature
en the furnace gases and the steam in
uperheater is reduced to 200° Fahr.,
ite of flow of heat, according to Mr.
idge, is reduced to about one B. T. U.
quare foot per hour. Unless, there-
the gases passing away from a boiler
nsiderably more than 200° Fahr. hot-
an the steam in the boiler, they are of
use for superheating to a serious ex-
n account of the large heating sur-
hat would be required. Apart from
he superheater at such low tempera-
would get coated with soot, and as
s a non-conductor of heat some ar-
ment would have to be adopted for
ing it, and "the game would not be
the candle." To prevent initial con-
ion completely in engine cylinders at
rates of expansion, a superheat of
400° Fahr. (i. e., above the ordinary
ted steam temperature) would ap-
be necessary.—*Mechanical Engineer.*

ench Automobile Congress.

ccordance with the decisions arrived
general meeting of the congress of
for the development of the automo-
dustry, it has been decided to organ-
s year the second international con-
of automobilism.

congress will be held at Paris, at
itomobile Club de France, from June
June 20, 1903, to coincide with the
ies organized in honor of the presi-
and delegates of the French and for-
utomobile clubs.

believed that all those who are in-
d in the progress of this compara-
new industry will consider it a mat-
honor to contribute to these labors,

MOTOR VEHICLE PATENTS..

United States Patents.

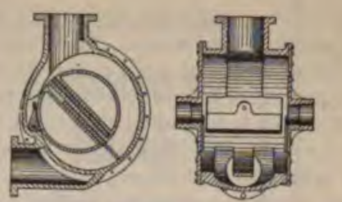
725,556. Electric Igniter for Explosive Engines.—G. A. Goodson, of Minneapolis, Minn. April 14, 1903. Filed March 7, 1902.

This invention relates to the Goodson ignition generator, which has already been described in this column. A spur gear on the crank shaft or cam shaft (according to whether the engine is a four cycle or two cycle) meshes with a spur gear loose on the armature shaft. A tripping pin extends laterally from the last mentioned gear. To the armature shaft outside the loose gear wheel is fastened a crank arm with crank pin, and the latter has journaled upon it a connection rod, which is surrounded by a coiled spring. The connecting rod head is provided with a projecting part, with which the pin fastened to the gear wheel engages at a certain point of the revolution of the gear wheel. The gear wheel thus drives the armature through one-half a revolution and then trips it, the pressure of the compressed spring causing the armature to turn faster than the gear wheel. To vary the time of ignition the field magnets are rocked upon the armature centre, they being mounted upon trunnions for that purpose.

724,132. Rotary Pump.—Edward F. Smith, of Bradford, Pa. March 31, 1903. Filed December 30, 1901.

The point of contact between the periphery of the cylinder and the shell of the pump is provided with a packing valve mounted in a recess in the shell, which is so held in contact with the periphery of the cylinder by the weight of the fluid being pumped that the leakage therethrough is reduced to a minimum.

At the point of contact between the ro-



No. 724,132.

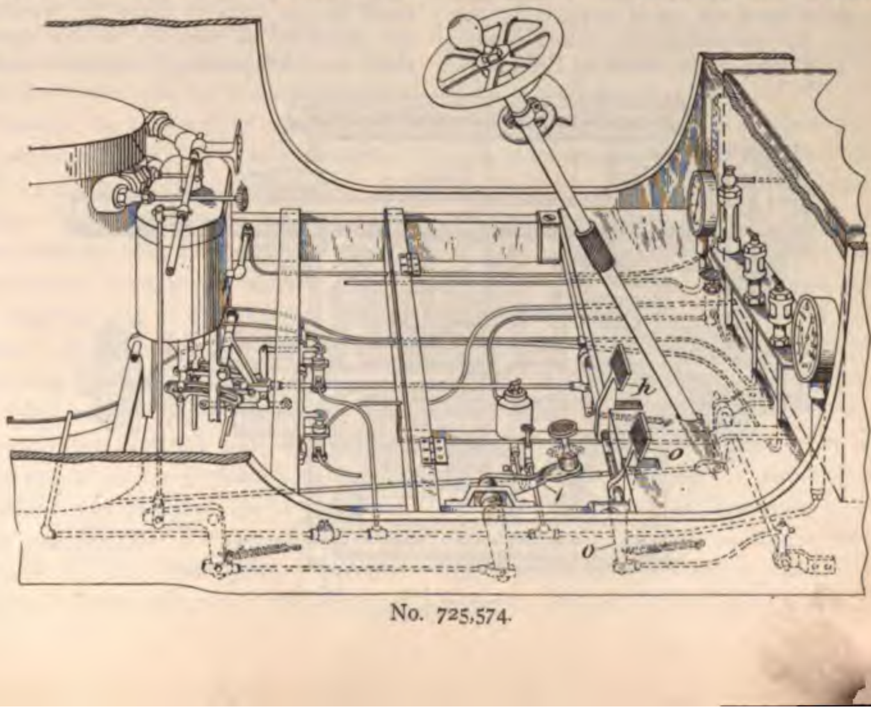
tary cylinder and the inside of the shell there is a recess in the inside of the shell, which extends nearly the entire length of the cylinder, and in this recess a packing valve is pivoted by means of bearings near the lower edge thereof. The upper edge of the packing valve normally contacts with the periphery of the cylinder, and the weight of the fluid acts upon the back of the packing valve and operates to constantly retain the upper edge thereof in close contact with the periphery of the cylinder, and at the same time any wear on the packing valve is automatically taken up, so that the leakage of the fluid between the shell and the cylinder at this point is reduced to a minimum.

725,574. Motor Vehicle.—A. N. Locke, of Salem, Mass. April 14, 1903. Filed April 29, 1902.

The invention relates to a steam car fitted with wheel steering and provides means whereby the throttle valve of the engine, the reversing mechanisms of the engine, and the brake mechanism may be controlled either singly or in combination by the driver's feet, leaving both hands of the driver free to control the steering wheel. When both hands are used on the steering wheel the danger of the steering wheel's being torn from the grasp by the wheel's suddenly striking stones or other obstacles is obviated.

A further object of the invention is to safeguard against tampering with the power controlling mechanism during the driver's absence.

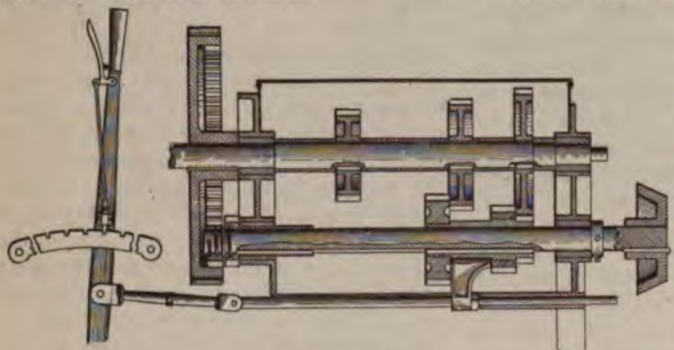
In the accompanying drawing *h* represents the reversing pedal; *o*, the brake pedal



No. 725,574.

and 1 a lever below the floor of the carriage for opening the throttle. This lever is operated by means of a pin extending through a socket in the floor of the car and provided with a foot button at its upper end. When the driver leaves the carriage he takes the pin with him and thereby prevents anyone from tampering with the motive power of the vehicle.

724,557. Gearing for Automobiles.—George P. Dorris, of St. Louis, Mo. April 7, 1903. Filed June 23, 1902.



No. 724,557.

A shifting gear, with novel reversing means. The gear comprises two superposed shafts, upon the upper one of which the shifting pinions are mounted. The pinions for the three forward speeds are shifted together. To the lower shaft are fastened three gears corresponding to the three pinions, and in addition an internal gear outside the casing and of comparatively large diameter. A pinion is mounted upon the upper shaft, at the end thereof, adapted to mesh with the internal gear, but is normally held out of mesh by means of a coiled spring at the end of the shaft. The pinion is mounted upon a long sleeve surrounding the shaft and extending through the bearing into the casing. The set of three shifting pinions are in the drawing shown in the position of slow forward speed. By moving them to the right the second and third speeds are engaged in succession, and after the gears of the third speed are out of mesh, if the motion is still continued, the sliding pinions will abut against the sleeve of the reverse pinion, and shift the pinion into mesh with the internal gear against the pressure of the spring.

725,223. Variable Speed Gear.—Middleton Crawford, of London, England. April 14, 1903. Filed December 12, 1902.

A form of planetary gear with conical friction clutches.

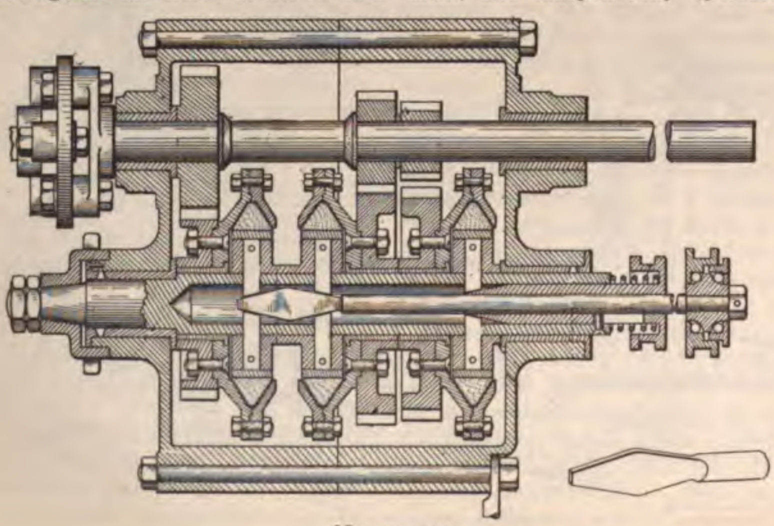
725,234. Gas Burner.—Rollie B. Fageol, of Des Moines, Ia. April 14, 1903. Filed February 28, 1902.

The air tubes of this burner have their ends reduced and are riveted into the burner plates. The mixing tube extends into the burner chamber from the side and abuts against one of the air tubes. Its lower half is cut away at the outer end for the gaseous mixture to enter the burner chamber, a better distribution being thought to be secured in this manner than if the gases left through the end of the tube cut off square.

724,202. Variable Speed Gearing.—Adolph Petteler, of St. Louis, Mo. March 31, 1903. Filed November 1, 1901.

This gear is of the individual friction clutch type. One of the claims describes the invention as follows:

In a variable speed gearing for automoblies, the combination with a driving shaft, of a supporting frame in which the same is journaled, a casing mounted on said driving shaft and movable thereabout, gears of different diameters arranged within the casing and fixed to the driving shaft, a driven shaft carried by said casing and having loosely mounted gears in mesh with the driving gears, a clutch member carried by each of the driven gears, a series of divided clutch members arranged on the driven shaft and co-operating with said driven clutch members, an idler interposed in one train of gears for reversing the direction of rotation of the driven shaft, and independently operable mechanism located in the driven shaft for forcing the divided clutch members outwardly and causing said shaft to be rotated forwardly at different speeds or backwardly through the idle gear at a slow speed.



No. 724,202.

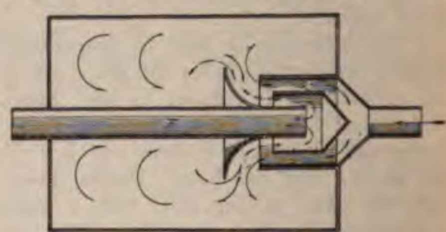
725,763. Manufacture of Cages for Roller Bearings.—La Verne W. Noyes, Chicago, Ill. April 21, 1903. Filed October 1, 1897.

725,766. Vehicle.—Harry M. Pope, Hartford, Conn. April 21, 1903. Filed August 11, 1900.

725,789. Explosion Engine.—Louis F. Splitt, Layton Park, Wis. April 21, 1903. Filed July 16, 1900.

725,379. Muffler for Engines.—Ralph P. Thompson, of Springfield, Ohio. April 14, 1903. Filed February 1, 1902.

This muffler is intended particularly for explosive motors. It consists of a cylindrical drum with a central opening in one head for the burnt gases to enter and a similar opening in the opposite head for the discharge of the gases to the atmosphere. Through the latter opening extends a pipe which passes through the centre of the muffler and extends into a tubular all at the opposite end of the muffler, through which



No. 725,379.

the gases pass into the muffler. A deflector of annular shape and having a concave wall is fastened to the discharge tube within the main casing. The escaping products projected through the tube are deflected and turned outwardly by the cone end of the drum flowing through the passage between the two drums and entering the main shell or casing at the open end of the drum, the products entering as shown by the arrows. The products will continue to enter the main shell or casing and expand therein until the pressure becomes sufficient to force the products outward in the direction of the arrows, passing over the peripheral edge of the deflector, and flowing in a stream inside of the inflowing stream entering the shell or casing from the channel or passage for the outflowing stream to flow into the discharge pipe and be discharged from the end of such pipe or tube. The projection of the products into the main shell or casing allows of an expansion of the products many fold, thereby reducing the pressure of the products, and when the reduced pressure reaches an equilibrium or degree to operate and cause an outflow of the products the force has been so greatly reduced that, after entering the pipe, the discharge from the pipe will not be attended with any great amount of noise and with but little, if any, projection, with the result of a practically perfect muffling of the discharge.

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...EVERY WEDNESDAY...

Devoted to Motor Interests

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☞ One week's notice required for ange of advertisements.

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Reduction of Subscription Price.

We believe the time has come when a technical publication like The Horseless Age will find a wider field of usefulness at a more popular price, and we have accordingly reduced the domestic subscription price from $3.00 to $2.00 a year. Dating from January 1, 1903, subscribers at the old rate will receive a rebate in the form of an extension of their subscriptions—six months for yearly subscribers and three months for six months subscribers.

Notice to Advertisers.

Hereafter the first advertising form will be closed on Saturday and the second advertising form on Monday preceding the date of publication. Copy for new advertisements or changes of copy must be in our hands on or before Saturday in order to secure insertion in the succeeding number.

No Disruption in the A C. A.

During the last fortnight automobile circles throughout the State of New York have been in a state of intense agitation. An obnoxious automobile bill had passed both houses of the Legislature and was at the point of becoming a law. The problem was to array against the bill all possible resisting forces and prevent its becoming a law by securing the Governor's veto, and also to locate the responsibility for the objectionable measure. Many were inclined to lay the blame upon the Automobile Club of America, the president of the club having approved the bill, or at least consented to it in the form in which it passed the Senate. Certain elements in the club itself, particularly the trade interests, were strongly displeased with the president's action, and talk was rife of a repudiation of the action, a disruption in the club, and organization of a rival club in New York city. But cooler counsel prevailed, and at a meeting last Saturday night the club decided not to send a protesting committee to Albany, and passed a vote of confidence in its president and law committee. Fortunately this put a quietus on a situation which was becoming acute. The historical order of events leading to the present situation may be briefly summarized as follows:

During the second week in March there were introduced into both houses of the State Legislature, at the instance of counsel for the Long Island Highway Protective Association, bills amending the present automobile law, known as the Cocks law. These bills contained very drastic restrictions, among the most objectionable being that persons walking or driving domestic animals upon the highway must not be passed at a greater speed than 8 miles per hour. President Shattuck, of the A. C. A., and Judge James C. Church, of the law committee of the club, at once proceeded to Albany, and in conferences with the sponsors of the bill secured what they considered a number of valuable concessions. Both sides finally agreed upon an amended text, as printed in our issue of March 25, which they considered the most favorable regulations at present obtainable.

When this text was published some of the very objectionable clauses at once arrested attention and were pointed out in Albany dispatches to a number of New York dailies. Active steps were at once taken toward the organization of the New York State Association of Automobile Clubs to oppose the passage of the bill, and a number of New York publications began a campaign of abuse against President Shattuck. The opposition movement grew in extent and intensity when, on April 17, the bill was passed by the Senate. President Shattuck was charged with having misrepresented the club and having acted in the matter in an unjustifiable, autocratic manner, without consultation with the Board of Governors, and protests were raised in the club calling for a repudiation of the president's approval of the bill. The Board of Governors of the club thereupon, on April 24, held a meeting at which they decided to uphold the president and not protest against the bill

as a club, but oppose it as individuals. This, of course, cleared the president of the charge of having acted on his own initiative and ignored the wishes of the governing board. In fact, there is nothing to show that he was not at all times in full accord with the views of the board.

The opposition in the club to the president's approval of the bills would not down, however, and a petition was circulated for signatures calling for a general meeting of the club on Saturday evening last. Meanwhile Mr. Church, of the law committee, had prepared a statement explaining and defending the course of that committee, which was furnished to all members in printed form on Friday last. The general tenor of the statement was that the bill as passed by the Senate was the best that could be secured at present and that if they had not agreed to it a more objectionable measure might have been adopted.

The club meeting was held on Saturday night and was exceptionally well attended. After the president and members of the law committee had given an account of their course in the matter resolutions were adopted that the club would not be officially represented at the public hearing given by Governor Odell today (Wednesday), and a vote of confidence in the president and the law committee was passed.

By this action the club has saved its dignity and integrity. Officers and members of the club alike regard the Bailey bill as objectionable and detrimental to the cause of the movement, but the officers take the standpoint that it is the most lenient measure that could be secured at the present time. If they are right in this—which of course can only be judged by those intimately familiar with the state of feeling at Albany and throughout the State—they may have been justified in giving their consent to the measure. If it should happen that Governor Odell signs the bill and the automobilists of the State are compelled to bear the undue restrictions for a period, the real cause must be ascribed to the outrageous disregard of the law, chiefly on Long Island roads, by scorchers both in and out of the A. C. A.

The protests which are being lodged today with the Governor by delegates of the New York State Association of Automobile Clubs, the National Association of Automobile Manufacturers and the New York Automobile Trade Association will not be in vain, however, even if the bill should be signed by the Governor. They will tend to temper the administration of the law and will pave the way for more lenient legislation next winter, provided, of course, automaniacs heed the public protests against furious driving and show more consideration in future for the common rights of the road.

A Special Touring Road.

On Saturday, April 11, there was inaugurated in Southern France what might in a way be regarded as the first of special automobile roads, about which so much has been written here. It does not exactly correspond with the usual conception of such a road—a speedway from which all other vehicles are excluded—but constitutes a scenic road along the coast of the Mediterranean Sea, specially built for the benefit of society automobilists who visit the so called Cote d'Azur every spring in such large numbers and for cyclists. The road was built by the Touring Club of France, an organization of 77,000 members, comprising cyclists, automobilists, hotel keepers and others. The road, which is known as the Nouvelle-Corniche de l'Esterelle, extends from St. Raphael to Cannes, a distance of 26 miles, winding through the cliffs along the coast and offering beautiful views of sea and mountain landscape. St. Raphael and Cannes are also connected by a national highway, which is both straighter and less hilly than the Esterelle road, and all ordinary traffic will presumably follow the former.

The inauguration took place in magnificent spring weather and was participated in by leading Government officials and the officers of the Automobile Club of France and the Touring Club of France. As an indication of the importance to automobilism of the new road, it may be mentioned that in the parade over the road on the day of inauguration 184 vehicles took part, the procession being headed by the car of the president of the A. C. F.

A New Direction in Commutator Design.

The difficulty of breaking away from time honored practices has been illustrated again by the great similarity in design between commutators for high tension ignition circuits and the old time mechanical trembler, to which the commutator succeeded in a sense. The contact spring, the base plate and the metal cover remained essentially the same, and only the steel cam was replaced with a disk of insulating material with a metal segment. This construction serves the purpose fairly well, the only faults which can be found with it being that when arranged for more than one cylinder the device is usually not as compact as is desirable, and that too great a portion of the enclosing casing consists of metal. These faults are remedied in a number of late constructions by arranging the contact segments on the inner surface of a casing of insulating material and the contact spring within this casing, so that the contact springs revolve with the shaft and the segments remain stationary. The segments are provided with studs which extend through the wall of the casing and serve as binding posts. With this arrangement only one spring is used for any number of cylinders, each of the segments being connected to one of the coils.

Defective Painting.

Quite a number of auto owners are complaining that the painting of the body and other parts of their cars is not durable. In a case which came under our notice recently the paint separated from the wheels in chips or blisters, pointing directly to lack of care in the process of painting. One of the causes for improper painting is undoubtedly that manufacturers are unable to keep up with orders without hurrying the machines through, and painting being the last step before the completion of the car, the time which should properly be spent upon it is often much reduced in order to avoid late delivery.

It is well known how tedious the process is of making a good carriage painting job. After the filler one coat of paint after another is put on and rubbed down, sometimes as many as seventeen coats being applied, and a certain time must be allowed each coat to set and dry.

Most automobilists do not care particularly for a very high finish, realizing that in regular use the paint is mostly covered by dust and dirt, but the painting certainly should be as durable as it is possible to make it. While it is therefore not necessary to give the surface as many coats as is usual in high grade carriage work, the separate coats should be allowed to set thoroughly, and especially is too early use on wet or dusty roads after the final coat of varnish to be avoided.

ubular wheels and sheet metal ve an advantage over wood con- in this respect, that they may be in a very short time.

Electrolyte for Storage Batteries.

probably occurred to many users c carriages, and to men in the ell, that if storage batteries could n the principle of dry batteries— ith a pasty or semi-solid electro- would be much cleaner to han- he acid would be less destructive nnections and other exposed metal t would presumably be less read- ated. Now, storage batteries are ade with a pasty electrolyte, the he common dry batteries. One ry, for instance, was exhibited in at the recent Agricultural Hall d was there hailed as something lty, although "dry" storage bat- already been made on the Con- ny years before. The only new the "dry" storage battery exhib- ondon was the material mixed lectrolyte proper to make a paste phate. In the "dry" storage bat- le previously the sulphuric acid vas usually mixed with silicates, ances.

ry" storage batteries may serve n purposes, where the rate of s exceedingly slow, but unfor- e, would be inapplicable to pro- tomobiles. The chief reason is vould present to a certain extent ifficulty as is always encountered batteries are subjected to strong, arges, namely, polarization.

harge current in a chemical cell lt of a chemical union between f the electrode and the electro- takes place at the surface of the That this process may go on ly new particles of the combin- ts must constantly be brought with each other. In a storage ing discharge the sulphuric acid trolyte combines with the lead ctrodes to form lead sulphate, ter. If there was no diffusion d soon be a layer of electrolyte e surface of the electrode from the acid had been taken, and ld prevent further chemical ac- nsequent electric discharge. To there must be rapid circulation n of the electrolyte. Where the latter is in the form of a paste there is of course no circulation at all and only slow diffusion, and this causes the phenomenon known as polarization in dry batteries. The layer of electrolyte in contact with the oxidizable electrode has become exhausted, and until new portions of the electrolyte reach the surface of the electrode by diffusion it is impossible to obtain a strong current.

From these considerations it follows that if a battery is required to work with heavy discharge currents it must have the best possible circulation of the electrolyte. Electromobile storage batteries are always required to discharge at rapid rates, and electrolytes in paste form are therefore impracticable for these batteries.

In addition to its detrimental effect on the circulation, the material added to the electrolyte to make a paste constitutes a dead weight not taking any part in the reaction of the cell, thus increasing the weight of the battery without increasing the capacity. Hence, while "dry" storage batteries may be suitable and advantageous for ignition purposes, their use in electric automobiles cannot be thought of practically.

Wear of Trunk Pistons.

A correspondent in a contemporary relates an experience with a stationary gas engine piston which, together with his comments, ought to be of interest to designers of automobile engines. The piston was of the usual trunk form, about one and one-half times the length of its diameter, with the wrist pin near the middle of its length and four packing rings back of the wrist pin, the grooves for the rings being rather close together and leaving little wearing surface on the end of the piston back of the wrist pin. Owing to the small wearing surface (according to his conclusion) the rear end of the piston was worn down about one-eighth of an inch in diameter, and, as the cylinder wall was also worn, the cylinder did not hold compression very well, and the engine developed "that tired feeling." The trouble was remedied by making a new piston, and to prevent a recurrence of excessive wear the new piston was made with two grooves for two rings each, one groove on each side of the wrist pin. This, of course, leaves the wearing surface on either side of the wrist pin the same, and ought to insure equal wear over the whole length of the piston.

It is customary in stationary engine practice to put one ring at the extreme forward end of the piston and two or three at the rear end, the forward ring being regarded as specially effective in insuring tightness of the cylinder. In automobile engines the forward end ring is rarely or never used. Whatever effect the relative position of the rings along the length of the piston may have on their packing qualities, a symmetrical arrangement certainly will promote evenness of wear.

Calendar of Automobile Dates and Events.

May 9 to 14.—Belgian National Circuit.
May 10.—Motor Cycle Century Run.
May 13—14.—Non-Stop Run of the Scottish Auto Club, Glasgow to London.
May 14.—Start of Paris-Madrid Tourist Section.
May 20—21.—Commercial Vehicle Contest under the auspices of the Automobile Club of America.
May 24—26.—Paris-Madrid Race.
May 25—30.—Alcohol Motor Wagon Trials at Berlin.
May 30 — Massachusetts Automobile Club Race Meet.
June 18—20.—Paris Automobile Fetes.
June 18—28.—Aix les Bains Auto Events.
July 1—15.—Irish Fortnight.
July 2.—Gordon Bennett Cup Race.

The Edison Storage Battery

[Considerable interest having been manifested by a number of our readers with regard to the present status of the Edison storage battery, we have endeavored to obtain some first hand information on the subject. The following data is the most reliable obtainable, and refers to the cell in its present form.—Ed.]

The negative pole or positive element consists of finely divided iron mixed with graphite. The positive pole or negative element consists of finely divided superoxide of nickel having the formula NiO_2. This is also mixed with graphite and not with mercury and copper as was reported.

The electrolyte consists of an aqueous solution of potash (potassium hydroxide), containing 20 per cent. of potash.

The initial voltage of the cell after a recent charge is 1.56 volts. The mean voltage of discharge is 1.28 volts, and the average capacity per cell—only one size has yet been made—is 200 watt hours. The weight per cell, including electrolyte and tray, is 16.5 pounds. One horse power hour is therefore stored per 3.73 cells or 63 pounds weight of battery, and it would take a battery of 38 cells weighing 640 pounds to store 10 horse

Assemblage of Grids.

Box and Lid for Containing the Active Material.

Steel Box Lid and Briquette of Active Material.

power hours. The charging and discharging rates are the same. The cell does not appear to be injured by overcharge or discharge, and only suffers in electrical efficiency under such conditions.

One inch has been added to the original height, making the dimensions of the cell 11⅞x3x5 inches.

To prevent their breaking when the active material absorbs the electrolyte, the sides of the pockets in the plates are now made concave. The concave pockets hold less active material, and to make up for this and prevent a reduction of capacity of the cell the plates are put nearer together, and twenty-eight plates are now used instead of eighteen, as originally. The weight of the electrolyte has been reduced, and as each plate holds less active material, the total weight of the cell has been increased only 1 pound by the increase in the number of plates.

Strips of rubber are now used between the plates as spacers or insulators, instead of glass tubes, a compound of rubber having been found, after many trials, which is not attacked by the potash.

Instead of increasing the weight of the retaining cells to strengthen them, they are now made with corrugated walls. It has been found that this answers the same purpose as an increase in weight.

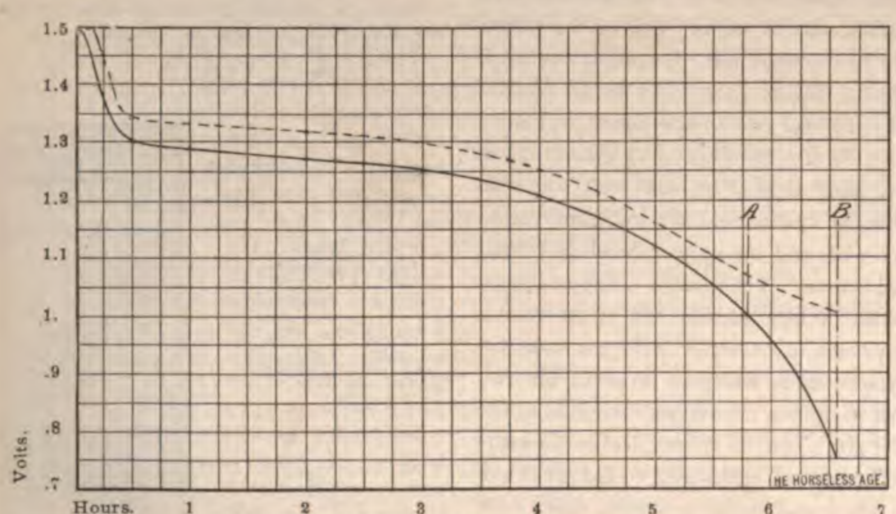
A diagram is appended giving the discharge curve of one of the cells.

The long delay in the appearance of the cell on the market can only be explained by the thorough tests to which it has been put, and to the many mechanical defects which have had to be overcome.

Four carriages have been run with the battery during the past two years on the hardest kinds of roads. Two Bakers, a Studebaker and a Waverley machine have been used in the tests with runs averaging 80 miles a day.

The cell which is to be put on the market this summer (orders for which have been on file and will be filled first) is particularly suitable for commercial delivery wagons, etc. Mr. Edison has already begun work on a smaller cell for runabouts and similar vehicles, and expects to have this cell ready for the market at the beginning of next winter.

W. Worby Beaumont has been appointed honorary consulting engineer to the A. C. of G. B and I.



Discharge Curve of Edison Storage Cell.

Current kept constant by means of variable resistance. At point A, after a discharge of 175 hours, the voltage has dropped 1 volt, and at B (197 ampere hours) to .75 volts.

LESSONS OF THE ∴ ROAD ∴

Experience with Three Gasoline Automobiles on the Poor Roads of Illinois.

By Chas. L. Turner.

My first practical experience with an automobile was during the fall of 1899. The vehicle in question was built in 1896 in Springfield, Mass., by a firm well known even in that time; it was rebuilt in '98, was sold to a party in the North, and in '99 I got hold of it. Its first cost was $1,800, but it was placed in my possession at less than one-third its first cost. Briefly described, it was equipped with a twin cylinder motor developing about 5 horse power, and with transmission by belts giving three forward speeds and a reverse. The flywheel and transmission pulleys rather resembled a speed cone, the four pulleys of successively decreasing diameters being keyed on the shaft adjacent to the flywheel which was largest in diameter. Back of this shaft and parallel to it was the countershaft with tight and loose pulleys, all of the same size. On one end of this shaft was a double expansion brake and on the other end a small pinion, which meshed with a large gear wheel surrounding the differential. When properly meshed these gears were quiet, but when too deep or not in line with each other they were noisy. In fact, they were the only thing to make noise, as the rig was very quiet running. I neglected to state that between the countershaft and the crank shaft, with their two sets of pulleys, were placed the idlers for keeping the belts tight. At the toe end of the brake rod a little dog or latch was placed, so that the vehicle could be locked on a hill—a good feature, which was valuable to me, as I will show later.

Steering was effected by a telescopic lever running back from the dash, insuring nice, easy steering, but the lever was somewhat in the way at times, especially when carrying three people. The driver sat on the left side, throttled the engine with his left hand and steered with the right. For starting, wet batteries were used, and in regular running a dynamo.

A gasoline pump worked by a cam on the crank shaft pumped up the gasoline through a small pipe over the muffler to the vaporizer, which was placed very near the head of the cylinders. This, coupled with the fact that the gasoline was pumped up near the muffler, had, of course, a tendency to warm the gasoline and vaporize it rapidly. The overflow, of course, was allowed to flow back to the tank, which held about 5½ gallons and was placed under the footboard. The water tank made part of the seat back, was of copper and held 12 gallons.

A great many will no doubt say "Why resurrect this old-timer? It is out of date and should be left with its fathers." But

serious question in my mind if some
: best points about it should not be
ed. I mentioned the fact to one
: manufacturers whom I met some
since, and who stated that he knew
agon was good, but that there was
ofit in it even at $1,800, and that it
not be manufactured in competition
the more modern vehicles, which is
ps true.
w for my experience. The rig had
oner arrived here than it was bought
party who intended giving

EXHIBITIONS AT FAIRS,

was engaged to run it for him. I
o start for Princeton, some 70 miles
, on Monday night, but on running
g out to my place (which is on the
it was found that the sleeve on the
xle to which one of the differential
is fastened had cracked, and, of
:, must be repaired, and that right
ly. A telegram was sent to the
owner, who in turn notified the fair
gers that we might be a little late.
air, by the way, was to pay us $100
y for Wednesday and Thursday, all
xpenses, and in addition give us all
de while carrying people around the
when no races were on.
a new sleeve was forged and ma-
l up, and as a boat runs between
a and a town near Princeton it was
ht that in order to be safe I had bet-
ce that boat at a late hour Wednes-
vening, so as to be in Princeton
Thursday morning. So down I
l for the boat landing, a distance of
s. But just before starting a bad
n a rear wheel, which I had blown
etty hard and which was standing
nice sheltered place, where it could
e full benefit of the sun, blew up
a loud report. I decided that to
the boat I had no time to waste, so
ng an emergency tire forwarded by
s, I started with the old tire flat, but
l just in time to see the boat leave.
tainly had no time to lose, so pull-
f the rear wheel I jumped onto a
car and ran out to a rubber tire
where the extra tire was. They
o have any hard rim cement melted
some soft stuff was substituted, the
t on, with the help of four men, and
ted for the wagon once more. I
for home, where I arrived just at
ate a hurried lunch, and notwith-
g the fact that I was not acquaint-
h the wagon I started for a night
is time with a friend for help and
ny. It was a cloudy night but
and the light was a fair sized kero-
amp, which furnished a light that
ed one of the juggler's saying:
you see it and now you don't." We
unning along at about 10 to 12
on the second speed, the roads not
of the best, although I thought I
hem pretty well. I was keeping a
ookout ahead, when I saw a light
ahead which I took for the good gravel road I was expecting. It was gravel, all right, but freshly placed there, a strip about one-quarter mile long the width of the track and about 8 inches high. I came upon it so quick that I failed to clear the gravel with one wheel. The wheel struck it good and solid, with the result that the

STEERING ROD CRACKED,

and about a mile farther we struck some deep mud and it gave way altogether. Then there was nothing to do but stay all night at a nearby house, leaving the rig at the side of the road. The next morning early I walked back home, a distance of 5 miles, leaving my friend to guard the rig. I had the new part made, and with the help of a hired rig was back at the wagon by 4 p. m.

We had no sooner got the new part of the steering gear in place than it began to rain, and I have never been out in such a hard storm before or since. We backed the rig to the storm and sat perfectly quiet while the storm spent its fury. Trees snapped off, the thunder roared and the lightning flashed, and I thought of the folks at home. Neither of us spoke; both wondered which would draw the lightning best, the iron and steel in our wagon or the telegraph wire overhead. But thanks to the good leather top and to the merciful Father above, we came forth in about three-quarters of an hour perfectly dry. Our belts were also dry, so, as we were close to the gravel road, we decided to pull through the mud to it and get as far as possible on our way before dark. As soon as we struck gravel I applied the first, second and then the third speed, and how we did fly! But at the end of the gravel we soon came to grief.

The old black mud was pretty well soaked before, and the hard rain which had just passed had not helped matters a bit. However, our engine pumped away bravely, never missing a stroke. The stiff, black tar mud rolled up on the wheels until they were twice to four times as big as normally. All at once "pish!" and off came the valve stem, and a little later the tire on which we had used the soft cement. It had never hardened. Caution:

NEVER USE SOFT CEMENT.

We ran to the next house with three tires on and one off. We engaged lodging for the night, and after a light supper went to bed. This was Thursday night, and all hopes of reaching Princeton even for an exhibition on Friday were spoiled, as well as our chance of earning the $200 and more. We had hardly got in bed when it began to rain, and kept it up continually until morning, when it ceased and the sun came out warm.

Upon inquiring I learned that a bicycle repair shop could be found in a little town 6 miles distant. Our host and team were hired at a cost of $3 to take us and the tire thither. I knew that if I could procure a metal valve I could fix the tire myself. The valve was found O. K., and the tire was repaired as follows:

A TIRE VALVE REPAIR.

First the old valve was cut out smooth, leaving a hole a little larger than a lead pencil; the top nut was then removed from the valve, a small piece of gas pipe long enough for the hand to grasp was slipped over the valve (the threaded portion), and some quick drying cement was then worked inside the hole. Next the hole was elongated by squeezing the tire together as much as possible. The valve was then forced in edgewise, the little gas pipe making a good lever and handle.

Rubber cement was next applied freely around the valve, a large iron washer placed outside the tire and the nut screwed down tight, the tire blown up and the job done. I have repaired a number of bicycle tires this way and some six or seven automobile tires, and I never knew one to leak.

After securing a cake of hard cement the tire was thrown in the spring wagon and we returned to where our auto was. I secured an old washpan, some corncobs and three bricks, broke up the cement in the pan, placed the pan on the three bricks, and soon had a nice corncob fire, which speedily reduced the hard cement to a liquid. This, of course, had to be stirred some to keep from burning. Next a swab was made by tying some waste to a stick, and the cement was applied (after cleaning the wheel well). The cement, of course, hardened immediately. Another piece of waste was moistened with gasoline and the cement moistened with it until it became sticky to the touch, when the tire was put on. The wheel was still on the auto, so by starting with the rim up, so that the valve was on top of the wheel, my friend and I got on opposite sides of the hub, and by pulling down with our hands and knees we were able to roll the tire on. This, of course, was blown up and let set before letting any weight upon it, but after letting it stand about one and one-half hours we concluded to "move on."

So far we had only covered less than 20 miles in three days, but then a bad beginning makes a good ending, and after this better progress was made.

We left at about 2 p. m., and after plowing through two little towns and about 10 miles of mud we suddenly came to good roads, and a little farther we found them nice and dry, so that we were able to make good time the rest of the way to my father's farm, where we arrived a little after 4 p. m. An early start was made the next morning, as we were determined to reach Princeton if there was such a thing, which we did in due time.

DITCHED THE CAR.

One incident deserves mention, which occurred on a large hill just before reaching our destination. The hill was very steep and we were nearly to the top, with several teams behind us, when all at once, in some manner, I lost the slow speed and the wagon began to go back. I tried to

jam on the brake, but in some manner the crank had got fast under the toe lever (we had two grips and some overcoats in front of us). I called to my friend to jump and grab a wheel, but the momentum was too great, and with the teams behind I saw that I must ditch the thing, which I did. The speed was increasing every second, but in less time than it takes to tell it I jumped the wagon over a ditch, over a mound and part way up a bank. Then she came back down and stopped on the mound in such a manner as to nearly topple over. I crawled out much scared. Some men came to our assistance, the rig was carefully examined, and, as it seemed to be O. K., the engine was started and we pulled up the hill. This time the brake was kept clear and has been ever since. It was a miracle that the auto was not smashed to flinders, and many there be which would not have stood it.

(To be continued.)

Experiences with an Air Cooled Car.

By H. B. H.

There is an old saying that misery loves company, and I had both misery and company last week when the rear axle of my machine broke in half just after crossing the tracks of the New York, Susquehanna and Western Railroad Company at Richfield Park, N. J., where a locomotive and train of cars were stalled, the cylinder head of the engine having blown out.

It was rather comforting to see the big steam monster that is supposed to have reached the perfected stage held up and unable to move, as helpless as any auto that was ever towed into a repair station, and it presented a sort of a moral lesson to me, impressing the fact on my mind that no matter what skill is used in design, steel will be flawed at times and breakdowns will occur.

Not to wander too far from my original theme, on the day on which this most serious accident happened I was riding toward New York, escorting two old machines that a local agent had sold and which he feared would not be able to mount Kelly's Hill, a notoriously steep grade up the Palisades, at the foot of which a team of horses is always kept to help tow loads up the grade and a sign announces that these may be hired for that purpose.

I was just going along for the ride and the fun of the thing, and when about 14 miles from home was bringing up the end of the line, when a small boy in the road shouted to me,

"MISTER, YOUR WHEEL'S COMING OFF,"

and started to gesticulate wildly. I was used to this sort of thing, as boys seem to take a particular delight in informing automobilists that their wheels are going around or their tires falling off, and my first inclination was to put on more speed and pay no attention to the lad.

Something impelled me to look around, however, and, much to my surprise and consternation, I saw that my wheel was coming off and half the axle with it. My particular make of machine has a live rear axle turned out of a 2 inch bar of solid machine steel, which should be able to bear any amount of road strain, and this was the last part of the car that I should ever have expected to give out, but it had, and as I looked the wheel was slowly working its way off the axle, slipping through the sleeve in which it revolves. I jammed on the brakes without delay, and after coming to a standstill sounded a signal of distress on my horn that brought the other machines scurrying back to my assistance.

Luckily we were near a hotel shed, and my car was towed under its shelter and we then started in to investigate. Upon jacking up the right rear end of the axle, on which side the wheel had been coming off, we were able to pull the wheel off entirely, the half of the axle coming with it.

Once drawn out of the sleeve it was plainly to be seen that the axle was flawed and had broken at the collar cut on it for a flat bearing against the differential, at which point it was a quarter of an inch thinner than at the extreme left end.

AN IMPROVISED JACK.

It was not such an easy task to get the other half of the axle out. Having but one jack it was necessary to rob a wood pile and build up a bed of small logs, on which the machine was lifted by our united strength. The differential was next dissected and taken apart and the key was driven out by the use of an eight pound hammer. In doing this the pins in the key slots were sheared off.

It was two hours' work to get this half of the axle out, but this having been accomplished, we took the old axle with us, and, arranging with a hostler at the hotel to guard the machine, started back home. We arrived in good time, and at once sent for the necessary material and set a machinist to work to make a new axle. This proved to be a two days' job, and on the morning of the third day after the breakdown, with the new axle complete, we started back to the scene of the accident. We found the machine in good shape, as we had left it, and were much gratified when the new axle slipped into place without any trouble, it having been made one-thousandth of an inch smaller than the one that had broken, and which bound slightly.

Our good luck continued, and after an hour's work we were ready to start home. The engine responded promptly at the first turn of the crank, thanks to the priming device with which it is provided, and the run home was made without mishap.

EXHAUST VALVE CASTING.

My next serious trouble was caused by a defective exhaust valve casting, which was cracked on one of the three lugs by which it was bolted onto the cylinder, the crack extending through to the inside of the exhaust valve seat. For the first week after I received the machine this crack in some manner kept closed, but later the stuff that had filled it dropped out or blew out from the continued explosion, and the machine began to lose power and to balk on hills that it had formerly ascended with ease. It was at first thought that the spark was weak, but a test proved that this was not so. The carburetor was reset, but to no avail, and finally it was decided to grind down the valves, and then the crack was discovered. A telegraphic dispatch to the factory brought a new casting within two days that was fitted into place within thirty-five minutes after it arrived. Had this thing occurred with most machines it would have been necessary to secure an entire new cylinder, but on my car the inlet and exhaust valve castings are made independent of the cylinder and bolted onto it. A short time after receiving the new casting I was troubled by the exhaust valve binding and refusing to close. This occurred on many occasions, the valve not seating and the engine stopping. Upon taking the valve out it was found that it had not been properly smoothed at the factory, as a result of which a lump had formed on the valve stem that prevented it from working. Reaming out the bearing in the casting and smoothing the valve stem put an end to this annoyance. This valve finally had to be discarded, a flaw in the metal on the edge of the valve seat causing a loss of compression through the valve not seating properly.

A new valve was secured and ground down to a seat in the new casting, and the machine immediately resumed its old time power and speed, which it still retains. Since securing the valve, which as a precaution I had put on a lathe and trimmed down until the stem worked freely in the casting bearing before inserting it, I have not been troubled by the exhaust valve binding and refusing to seat, as was the case with the old valve. Of course, each time the valve stuck the engine would stop, and it would take ten or fifteen minutes to get the valve released so that it would work again.

GEARS LOCKED ON A HILL.

A most peculiar accident, or perhaps it would be better to term it a coincidence, happened me while going over the Fort Lee hills on my way to New York. These hills are exceedingly steep, and one Sunday morning about three weeks ago I started out to climb them, having four persons in the wagon, all of fair weight.

Everything went lovely and we had climbed all the grades with the exception of that one immediately outside of the old Revolutionary village of Fort Lee, which is about an eighth of a mile long and slopes up to a 20 per cent. grade in places. We were grinding along slowly on our low gear with the motor humming merrily, when suddenly the carriage began to slow down and the engine to kick in an unprecedented manner.

I pushed the spark and gas lever forward, giving the engine all the power, but to no avail, and it began to show signs of stopping. We were just on the steep-

rtion of the grade at this point, and w out the clutch and jammed on the gency brake, expecting to hear the e speed up at once, but strangely h it showed no tendency to do this, fter a few kicks it gave a long, sob-gasp and stopped entirely.

obliging boy, one of a crowd of a who had gathered around, blocked ar wheels with a stone, I insisting on this precaution before releasing my on the foot brake. The wheels once ed, I climbed out and started to look e trouble. Upon putting the start-ank in place and trying to turn over notor I found that the gears had d inside of the gear case and that the did not have power enough to pull around.

machine is equipped with an extra-rily heavily constructed sun and t gear, giving two speeds forward reverse. It is fitted with brass pin-and oil holes are provided by which may be lubricated.

of the first instructions, or rather ns, given me by a wise friend who sed the same sort of a car and knew out its vagaries, was not to put too oil on these pinions, as the lubri-vould surely be thrown up under the bands and these would not hold climbing a hill, and consequently I iled them rather sparingly, and as a of this the pinions had become eated by the hard work forced upon and the brass of which they were osed was swelled and had expanded, g the gears.

mediately soaked the gears with oil, hen with the assistance of my four ngers and a dozen or more "kids" we d the machine up over the last few f the grade and on to the level, it my duty during this short trip to the car and hold open the compres-

e on top of the hill I got under the ne with a heavy wrench and pound-the gear case, in this manner jarring inions loose so that the oil could them. Inside of quarter of an hour had been freed again and were in working order and I started the en-and we resumed our trip without fur-difficulty that day.

the following week I decided to go the same route again, taking the passengers along, and before start-took the precaution of oiling the rather generously. During the ew days after I had been caught I een giving these same gears a daily ith, and so upon this occasion they lenty of lubrication.

SULT OF EXCESSIVE LUBRICATION.

new Fort Lee trolley line runs par-vith the road for a considerable dis-and we left Paterson at the same as the car, keeping up with it all the route, much to the pleasure of uests and to the excitement of the passengers on the trolley. About 5 miles away from my "Waterloo" hill the trolley line bore away from the road, only to come back to it again on the hill. We went spinning along, intent on arriving at the steep grade a little before the trolley, and succeeded in doing so. I ran up the grade as far as possible on the high speed, and then, as we struck the steep portion, I put in the low speed gears and began the hard climb just as the trolley car rounded the curve at the foot of the hill and began to ascend the grade. For a few feet we went along nicely, and then the machine suddenly began to slow down, despite the fact that the engine was going at its full speed. The machine went slower and slower, and even threatened to go backward, and the engine raced madly. After a minute or so it was apparent that the clutch would not hold, and I was obliged to back into the gulley alongside of the road just as the trolley car crept by, its passengers greeting us with all sorts of jests and cries. Not wanting to be left for good, I worked the machine around and tried to back up the hill, but the reverse also slipped, and there was nothing to do but to get out and tighten the clutches.

Before stopping the engine I crawled under the machine and forced pieces of waste under the clutch bands in order to wipe off some of the grease, it being apparent that too much of a good thing was equally as troublesome as an insufficiency. It was a half hour's job to tighten the low speed and the reverse clutches, and this once accomplished we started again and went up the hill without difficulty.

After these two experiences I have decided that the best method is to oil the machine regularly, giving each part a regular amount, and each day I go over it now and do this, and I have had no further trouble in this respect.

The mixer or carburetor on my machine is a very simple device, consisting of a carburetor of the regular float feed type with a suction screen attachment. The gasoline and spark are controlled by one lever, which is located on the steering post, and by a movement of this the engine speed is varied from 100 to 1,200 revolutions a minute. In going down hills coasting with the gears out I had been in the habit of cutting the motor down to its slowest speed, and one afternoon, after having run down a long hill, I pushed the spark lever forward, but the engine did not respond, and the machine finally came to a dead standstill as soon as the momentum secured in the coast downhill had been exhausted.

I got out and went through the starting operations to find that nothing was the matter at all, and the engine had been choked down so much that it could not suck in enough gas to explode itself. I have since found that letting the motor run so that the explosions can be heard at all times is the best and safest method.

STOPPING AN AIR COOLED MOTOR.

Speaking of safety brings to my mind the fact that I had been sitting over a miniature volcano in the form of a 10 gallon tank of gasoline and giving it every opportunity to boost me skyward, and was entirely unconscious of the fact at that. Despite the evident perfection of the air cooling system, after a run of any great length the engine will heat sufficiently to explode itself, sometimes continuing for several minutes after the spark plug has been taken out. The instructions in the book issued by the manufacturers anticipate this and state that when the motor does not stop the best thing to do is to put in the low speed clutch and hold the brake bands that bind on the transmission as tight as possible.

I had done this on several occasions, and as a result had often had a hard time to get the engine stopped, as the throttle valve does not shut off the supply of gasoline at any stage, and the engine would explode and accumulate sufficient power to move the machine along, and I would go jerking up the street as the explosions came irregularly, and then jerking back again on the reverse, until the engine finally gave up in despair and snorted itself into quietness.

I hit upon the plan of opening the compression relief and stopping the motor in that manner, which worked very well, until I was informed by one of the men at the repair station that such a course might result in a back firing into the gasoline tank, there being no check valve between the supply pipe and the tank.

I was not sure whether he was joking with me or not, and in fact I may as well confess that I have not been convinced as yet. I cannot figure out myself how any such catastrophe could be brought about, but as I am not taking any chances of exchanging an earthly home for a saintly one I am stopping the engine with the clutch, and will continue to do so until I receive a reply to the letter I have written the manufacturers asking information on this most essential point.

Tire troubles and the fact that my main bearing oiler, or rather cylinder oiler, insists on oiling the outside as well as the inside of the cylinders, completes my list of troubles for the present.

PACKINGS AND WASHERS.

I may say, though, that if nothing worse comes along I will not complain. The washers in the cylinder oil cup, which is a large one located in the centre of the footboard, refuse to stay tight, and I am now trying all sorts of packings and washers, and believe that I will finally be successful in getting the oiler tight and make it deliver its contents in the proper place.

AS FOR TIRE TROUBLES,

they are ever present and ever threatened. A disobliging front tire picked up a screw a few days ago as I was speeding over a country road 10 miles from home, intent on getting in ahead of a threatened rainstorm that had already sent down a few stray drops as a warning.

I noted the puncture from the fact that

the machine had a tendency to run into the gulley on the side of the road that the deflated tire was nearest. The tires on this machine are hidden from the driver's view by the heavy mudguards.

There was nothing to do but to get out and fix the thing, and this was no small task, as I had never repaired an inner tube tire before. Luckily enough, I had a new inner tube with me, so I dug into the tool box and took out the small repair kit that is furnished with the machine.

Two undersized tire irons of about the length of a first class jackknife were furnished, and were the implements with which to remove a 30x3½ tire that hugged the rim in a most aggravating manner.

After having loosened all the clamps and taken off the lock nut from the valve stem it took me twenty minutes' time and cost the expenditure of many cusswords to get the outside shoe off. This once removed I dragged out the inner tube and started in to insert the new one.

Having no French chalk and no experience, this proved to be a job of the kind that I would not want to see my worst enemy employed at. It took just three-quarters of an hour to get this tube in place and force the shoe back on the rim, and all the time the rain, which had started to come down in torrents shortly after I began my task, was trickling down my back. The road was a perfect ocean of mud, and I was covered with the mire from head to foot. The tire was finally pumped up, and I started from home and reached there all right. The machine was put up and I went home to dry out. The next morning I was informed that the front tire was flat.

I went to the storage station, and upon investigation found that the "sick" tire was the same one that I had expended so much of my time on the preceding afternoon. We took the tube out, or rather dragged it out in pieces, for it was full of holes as a result of the pinching it had received. In my haste I had not put the tube in the shoe properly, and the clamps had caught it and cut it. The tube was utterly worthless, and I figured out that this little puncture cost me $7 for a new inner tube, 50 cents for the man's time in putting it in, 50 cents for cough medicine to cure the cold that I contracted, and I am now awaiting a bill from the tailors for scouring and pressing a suit of clothes, to say nothing of the time I put in on the job myself.

De Dion et Bouton have patented a balanced twin cylinder motor, in which the crank pins for the operating cylinders are placed in line with each other. Between the two working cylinders is placed a third cylinder of small diameter, in which reciprocates a piston equal in weight to the two working pistons. This piston is connected by a rod to a crank pin between the two crank pins of the working cylinders and at 180 degrees with them. The motion of the central piston, connecting rod and crank pin balances that of the working *crank* pins, connecting rods and pistons.

A Light and Useful Alloy.

Magnalium is the name given by Dr. Ludwig Mach to an alloy composed of magnesium and aluminum. Both these latter are most difficult to work. For instance, aluminum chokes up the file and is liable to break, while magnesium is so tough that neither a file nor the turner's chisel can make any impression. Magnalium, on the other hand, is more suitable than either of its component parts. Alloys containing up to 30 per cent. of magnesium furnish a metal the hardness of which lies about half way between yellow and red brass, and which may be easily worked with any tool; even the weakest screw threads can be cut with proper keenness. The chips are like those of yellow brass, the faces of the pieces are smooth and bright, and choking never takes place even with the finest files. Magnalium, moreover, is chemically less assailable than either of its components. Aluminum by itself has a very indifferent exterior, while magnesium by itself is greatly affected by the air, and oxidation will gradually extend far into the interior. Magnalium is silvery white, remains unaffected by exposure to the air, nor can ammonia or acetic or sulphuric acid harm it in any way. It surpasses aluminum in gloss, tractability, firmness and lightness.

The combination of aluminum with copper or with zinc can easily be made, but as these two metals are a great deal heavier than aluminum, all the advantages due to the light weight of the latter are lost. While aluminum has a specific weight of 2.7, the alloys referred to range between 3 and 3.5. A notable contrast to this is presented by the specific weight of magnalium, which is less than that of pure aluminum—viz., 2 to 2.5—according to composition. For melting purposes, crucibles of graphite or of iron are used, the inside of the latter having been lined with clay and magnesia. Molten magnalium can be poured into the thinnest vessels of a diameter down to 2 millimetres and of the most intricate forms, and will fill them up thoroughly and faultlessly. It becomes soft at 570°, melts at 600° and becomes fluid at 630° C. On account of its lightness and its silvery white color it is in a high degree suitable for optical instruments and similar articles. Unfortunately, sea water is inimical to magnalium, especially when the latter comes in contact with other metals.

In cases in which, for technical purposes, great solidity is of paramount importance, as, for instance, in regard to large castings, an alloy of from 3 to 5 per cent. of magnesium is most suitable. An addition of 10 per cent. of magnesium would render magnalium brittle, while 30 per cent. of magnesium would reduce the solidity of the alloy still more. With only 2.4 per cent. of magnesium added, magnalium can be forged at a temperature of 400° C., and will then act in a similar way to copper at red heat. If containing less than 5 per cent. of magnesium, it may be forged in the cold state, and if perchance the hammering has rendered it too hard, it can be made malleable again by heating to a temperature of 500° C. and chilling it thereupon in cold water. The price of magnalium is about the same as that of copper, and depends mainly upon the price of magnesium.—*Mechanical Engineer.*

Trade Literature Received.

Cudell Automobiles.—J. C. Brandes, New York city.

Crank Forgings.—Wyman & Gordon, of Worcester, Mass.

Battery Charging Plants.—National Engine Company, of Rockford, Ill.

High Grade Gas and Gasoline Engines.—National Engine Company, of Rockford, Ill.

Dietz Lucifer Acetylene Gas Lamp.—R. E. Dietz Company, 60 Laight street, New York city.

"High Grade Automobile Motors and Accessories."—Clemick-Hirsch Company, of Milwaukee, Wis.

Circulating Geared Pump.—The Garvin Machine Company, Spring and Varick streets, New York.

The Haase Automobiles.—Northwestern Furniture Company, 271 West Water street, Milwaukee, Wis.

"Vulcabeston" Molded Union Washers, Sheet Packing and Valve Stem Packing.—H. W. Johns-Manville Company, of 100 William street, New York.

New Incorporations.

Michigan Automobile and Carriage Company, of Detroit; capital, $10,000.

Automobile and Motor Company, Syracuse, N. Y., to manufacture automobiles, motor cycles and automobile sundries.

Howard Automobile Company, of New York; capital, $10,000; incorporators, John J. Amory, Charles L. Seabury and William S. Howard.

Knickerbocker Auto Car Company, of New York; capital, $5,000; directors, O. T. Sherman, J. F. Couch and Dixie Hines, all of New York.

Onondago Automobile Company, of Syracuse, N. Y.; capital, $150,000; directors, G. L. Gridley, G. E. DeLong and J. S. Palmer, all of Syracuse.

New York Long Distance Automobile Company, of New York; capital, $10,000; incorporators, Lewis Nixon, Wm. M. McDougall and Francis S. Hutchins.

Frank B. Davis, of Youngstown, Ohio, and Leon Rubay, of Paris, France, have formed a partnership under the style of Davis & Rubay, to import French automobiles and supplies.

The New York and Chicago Road Association, New York, N. Y.; to obtain an improved highway between the two cities; directors, Col. Albert A. Pope, of Cohasset, Mass.; William L. Dickinson, of Springfield, Mass.; William S. Crandall and A. H. Battey, of Brooklyn, New York, and L. C. Boardman, of New York city.

laintenance.
nd Repairs.

I.—Steam Engine Repairs.

WORM CROSSHEADS.

e crosshead (Fig. 3) in some of the machines was of very poor design. same form, although somewhat heav- nade, is still employed in some machines. The point of greatest wear (and generally of excessive wear) is the back A of the shoe, Fig. 3. It is generally made of best phosphor bronze, and the best way to renew this piece is by "sweating" on a flat piece of hard phosphor bronze, after having filed down the old surface to get it of the same approximate thickness all the way. To

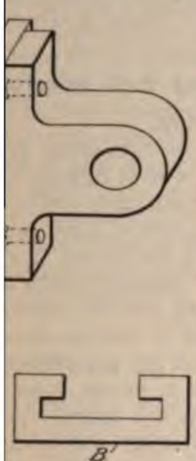


FIG. 3.

on a new piece, tin the back of the nead already filed and one side of the ece of phospher bronze, and then, put- them together in their correct relative ons, clamp between two blocks of in a vise and apply the heat from a torch or a very large soldering copper, lose up on the vise. Watch the joint, when the solder is seen to ooze out in beads all around remove the source of and the job is done, and in a minute o may be removed w fit it to the slide, which in cross n looks like B, Fig. 3. The slide will ally be found to be more badly worn e lower end, and this end should be ed a little with a file to correct this ality. A dead smooth file should be to finish with. After correcting this, e crosshead by filing and scraping, it bears evenly all along, and then two flat head brass machine screws No. 4, C and D in Fig. 3. The strips phosphor bronze are shown in place Have the heads of these screws below the surface of the strip and let nds come through and project about

FIG. 4.

one-thirty-second inch, when they should be very tightly riveted to preclude any possibility of their working loose.

As a rule the wear upon the wrist pin in the hole in the crosshead is very slight, and sometimes a partial rotation of the pin and tightening by its nut in the new position will remedy any looseness temporarily. Should a new pin be necessary, it may be made in the lathe, but generally the best and cheapest way in this particular case is to send to the factory for a new pin. This applies also to the case of the hardened steel bushing which is forced into the upper end of the connecting rod.

Another and much more sensible form of crosshead is shown in Fig. 4. The wear upon the sliding surfaces of this form of head may be taken up almost until they are worn through by merely inserting slivers of sheet metal of the required thickness behind the slides, there being two to each crosshead with this form.

The slivers should be divided between the two slides and not, as is oftentimes the case, all under one slide.

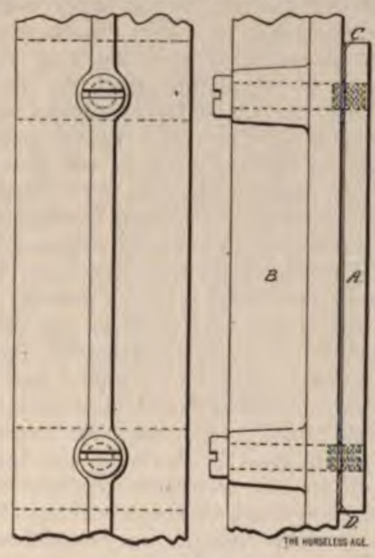


FIG. 5.

Fig. 5 shows one of these slides A screwed to the engine frame B and slivers C and D in place at either end.

REGRINDING SLIDE VALVES.

Many machines, both old and new, through lack of sufficient lubrication in the cylinders and steam chests, have the slide valves and their seats scored or cut more or less badly. This results in enormous waste of steam, since live steam is going by way of the eroded places out of the exhaust at all times when the throttle is open.

In engines which have this trouble it may nearly always be noticed by the thick continuous exhaust when running in contrast to the short, decisive puffs when this feature is absent.

The remedy for this trouble consists in scraping or grinding the slide valve and its seat in the steam chest. The writer has never yet seen a case so bad that careful grinding would not entirely correct it.

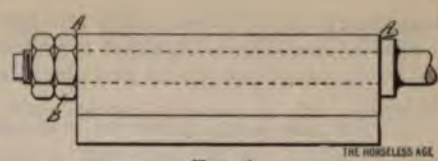


FIG. 6.

The cover over the steam chest should be removed and the valve itself disconnected from the valve stem. Clean away any foreign matter at the joint between the valve and seat with gasoline, and begin with emery and oil, smeared upon both surfaces, giving the valve an oval motion, and wiping clean and renewing the oil and emery as soon as the grinding capacity of a charge is exhausted. Begin with about No. 90 or No. 100 emery, and use a finer grade at each new application, finishing with flour emery. In performing this operation the steam ports should be fitted with oily cloth stuffed in tightly to catch any particles of emery and prevent their entrance into the cylinders later on. If properly done the result will produce a job equal to or better than new.

Before reassembling wash the surfaces thoroughly with gasoline applied with a stiff bristled brush.

ADJUSTING VALVE STEMS.

The valve stem, where it goes into the slot in the valve, will generally be found badly worn, so that there is more or less lost motion in the valve, which will interfere with the proper action of the same in the admission of steam to the cylinders. This wear takes place at A A, Fig. 6.

This looseness should be corrected, and this is best done by tightening up the threaded washer B, constituting a nut, until there is no perceptible play, but yet so the valve will drop from the stem of its own weight.

After thus tightening, the nut should be locked against further loosening by very lightly riveting the projecting threaded end of the stem over it.

SUBSTITUTING A RING PACKED PISTON FOR A PLUG PISTON.

In an earlier steam runabout still in extensive use the piston was of a construction that would not meet the approval of a thorough mechanic. It was called a plug piston, and depended for its tightness under pressure (essential to the economy of the engine) upon a so called capillary seal consisting of three or more shallow grooves turned in a plug of cast iron, which in turn was fitted to the bore of the cylinder, with just enough clearance to prevent binding when expanded by the heat. This design is eminently unsatisfactory, and the

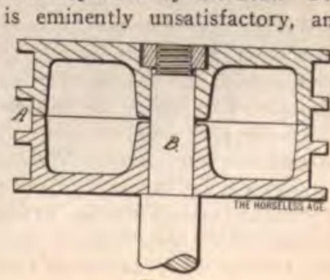


FIG. 7

best thing to do when one comes into possession of one of these machines is to take measurements of the piston and throw it away.

A good ring piston should be made to take its place, and as these plug pistons are generally made there is room for three rings five-sixteenths inch wide each. A good construction is shown by Fig. 7, page 553. The piston is composed of halves, as shown, and these are made from iron castings, for which one pattern will answer.

The hollow portion is cored out, the pattern making its own core. All the rest, including of course the hole in the centre for the piston rod, is machined.

The joint at A, which comes midway the width of the middle ring groove, is finished by grinding, the two halves of each piston being mounted upon a rod a trifle less in diameter (say, 2-1000 of an inch) than the portion B of the rod. This is done in order that the drive fit of the rod at B will not be loosened by rotating in the grinding, although, as a matter of fact, it would be very difficult with a drive fit to turn the parts to grind them. The nut at the end for locking the halves firmly together is recessed as shown to avoid striking the cylinder head.

This nut must be secured against loosening by riveting or by centre punching the end of the rod.

A Family Garage.

A striking illustration of the hold automobiles take upon families after one member is initiated is shown in the Guggenheim family of New York. There are seven brothers, and but one of them has withstood the fascination of the motor car. The other six own between them fifteen cars, including every style of automobile. So large are their holdings that lately they have pooled their interests and established a private garage at 208 West Seventy-seventh street, which is within easy access of their homes.

The building is two stories and 25x100 feet. The upper floor is used for a general storeroom in part, and there is also a well equipped machine shop. All the repairs are made there by regular employees of the family, numbering eight chauffeurs, three of whom are skilled mechanics. There is also an electrical expert and a washer. The lower floor of the building is used for a garage.

The brothers together own nine electric and six gasoline machines.

It is generally regarded as a defect that the headlight of an automobile in turning a curve throws its cone of light in a direction parallel with the vehicle body and not in the direction in which the vehicle travels. This may give rise to serious trouble, and to avoid it the firm of Weichmann, Vienna, has devised an arrangement, exhibited at the recent Vienna automobile show, whereby the headlight is turned at the same time as the front wheels by means *of a simple link.*

..COMMUNICATIONS..

Design to Suit American Conditions.

Editor Horseless Age:

The article by C. W. M. on "Unsafe Wheel Steering" in your last issue is but part of a needed protest against impractical features for the American market. The fact that some millionaire buys a French touring car, with which he traverses the splendid roads of the Continent for several weeks, is no reason why busy Americans, who do not get one week in a year for touring, and who have few roads suited to high speed, should likewise buy a touring locomotive, and yet it is that sort of snobbishness that has largely directed the growth of automobiling in this country for a number of years. In a land of good roads, with few railroads, the high powered vehicle, properly termed a "car," is doubtless well enough, and with it in its place I have no quarrel, but the idiocy begins when an attempt is made to use such vehicles for practical purposes over such roads as are found throughout the major portion of the United States. Being built for good roads they are almost universally geared too high for bad ones, and must of necessity creep up the hills in a disgustingly slow manner. Having no obstacles to encounter, their mechanism is placed too low, with the result that vital parts are damaged by contact with the ground.

In the New York-Rochester run vehicles with little clearance found the roads impassable because of the high ridges in the centre, while instances have occurred of high priced foreign machines striking their crank cases or flywheels, and being laid up for several months on their first attempt to get out of New York city. The conditions in America are so different from those abroad that the same vehicle will not meet both. Our rough roads require constant steering to avoid holes, rocks and similar obstacles, and for this purpose the lever is much better than the wheel, as C. W. M. rightly says, particularly on light vehicles. On rough, muddy or hilly roads, the heavy vehicle is out of place, for unless it is decidedly overpowered, and therefore wasteful, it is not able to extricate itself from the bad spots so frequently found.

The simple control is likewise more necessary here, where the varying road conditions demand constant changing of speeds, than in a country where the high gear may be taken from the beginning of the run to the end. On this account the controlling levers must be few and easily manipulated, and I am pleased to see that a man of Mr. Bickford's ability pronounces in favor of three levers only for forward driving. The masses who will eventually use automobiles will use them not for the fun of it, but for the service rendered, and they will not wish for a multiplicity of levers that they may show to a gaping public how dexterous they are, but will accomplish their work with the fewest possible levers and the simplest operation thereof. If these facts are admitted then manufacturers should design accordingly, and not retard the growth of the industry by copying forms unsuited to American needs, even though apparently demanded by a few snobs who wish to show off the fact that they have been abroad and acquired a motor vehicle taste.

Chas. E. Duryea.

The Friction of Ball Bearings.

Editor Horseless Age:

The paragraph on "Friction of Ball Bearings" in your issue of April 15 is misleading. There are extremely few bearings which rotate at the rate of 5,000 rotations per minute. Indeed the phrase "5,000 rotations per minute" means nothing to the reader until he finds out the diameter of the bearing. Speed of bearing should always be expressed in feet per minute.

The imperfection in action of any ball bearing whose balls are neither spherical nor of uniform diameter will always be exaggerated at high speed. As much care would have to be exercised in the construction of a bearing for the speed which 5,000 rotations per minute somewhat vaguely suggest as would be required in the construction of any other form of bearing for such speeds. In other words, the balls would all have to be the same diameter, very accurately gauged in cases, and on cones very carefully ground. There is nothing inherent in the design or action of the ball bearing that would bring about the so called "shattering action," which is probably caused by varying diameters of balls in the ring where the large ones catch up and strike the ones ahead, and are thrown violently back by reaction, which is repeated very rapidly in high speed bearings.

Whenever balls shear under heavy loads it will be found that they have been put to a strain beyond their crushing strength, or ultimate shearing strength, as the case might be.

In view of the fact that your article might raise doubts in the minds of those who contemplate using ball bearings, it might be well to call attention to the growing demand for ball bearings in the older and best developed lines of manufacture, like tool building, where great stress has to be resisted under comparatively high speed.

Federal Manufacturing Company,
Charles E. Hadley,
Mechanical Engineer.

[We are obliged to our correspondent for his criticism and explanation of the shattering action occurring at high speed. As to the possibility of the extract misleading prospective users of ball bearings, we believe there is little cause for fear. It is generally understood among engineers

ball bearings, like all other bearings, their limitations in regard to rotative and specific pressure. It was evi- the object of the author to deter- these limits and the manner in which earings failed when these limits were ed.—Ed.]

kel Steel for Exhaust Valves.

r Horseless Age:

ase inform me through the columns ur valuable paper as to the most sat- ory proportions of carbon and nickel haust valves of gasoline motors.

C. C. Salisbury.

ckel steel containing 36 per cent. of is recommended by one authority. ing is said about the proportion of n, but it is to be presumed that the percentage in steel will be satisfac- Nickel steel of 36 per cent. nickel temperature coefficient of zero—that is not expanded by heating.—Ed.]

lice Traps in Massachusetts.

r Horseless Age:

you have a good many readers in Bos- nd vicinity, will you please publish ng that police traps are being set in Concord and Lincoln, Mass.

y not adopt a common warning for traps? Red confetti thrown on the at about one-eighth mile from trap, heap red flag nailed on a tree or post e right hand side of the road going d the trap. I should like to warn obilists coming into Concord, but I not time to stand guard. S.

acked Plug Porcelain Puzzles Automobilist.

Horseless Age:

ead with much interest H. B. H.'s on three weeks' use of an 8 horse air cooled motor. I have a machine same make which I have used in the t and coldest weather since March 02. He anticipates trouble in July er, but he is doomed to disappoint- unless he lets his fan belt get loose, e the engine will not heat up under nd of work unless the pins are filled mud or the fan belt loose. He prob- ill forget in time he has a spark plug, never has to be cleaned. I used my al plug until this past month and racked the porcelain in it. I inserted tra plug furnished me when I bought achine, and after an hour's cranking sting of the entire outfit (the plug d beautifully when out of the cylin- telephoned to the New York agent. ame out and spent as much more n going over the ground as I had. ally tried an extra plug he had in and the engine started at the first I found on taking my new plug that the porcelain was cracked and not spark under compression, but beautifully outside. So far as I know, no one has ever had this trouble and this may save someone a day's labor.

E. A. Fairchild.

Touring Route from Milwaukee to Buffalo.

Editor Horseless Age:

Will you be kind enough to print the best automobile route from Chicago to Buffalo, or, better still, from Milwaukee to Buffalo. I wish to make the trip from Wegauwega, Wis., to Buffalo in July, and can get to Milwaukee all right, but wish to learn the best route from there on. Please print it in The Horseless Age so I will get it before that time.

W. E. Hinchey.

[From Milwaukee to Chicago the best and shortest route is the shore road via South Milwaukee, Racine, Kenosha, Waukegan, Lake Forest and Evanston. From Chicago the following route has been pursued by most automobilists who have made the trip from there to Buffalo: South Chicago, Hammond (Ind.), Chesterton, La Porte, South Bend, Osceola, Elkhart, Goshen, Millersburg, Kendallville, Waterloo, Butler, Bryan (Ohio). If it is desired to visit Toledo, which involves running on some rather bad roads, the trip is continued from Bryan via Stryker, Archbold, Wauseon, Swanton and Holland to Toledo. Otherwise the somewhat shorter and better route, Bryan, Stryker, Napoleon, Bowling Green, Fremont, is followed, and the trip continued via Clyde, Bellevue, Norwalk, Wakeman, Oberlin, Elyria, Cleveland, Paynesville, Madison, Geneva, Ashtabula, Kingsville, Amboy, Conneaut, New Springfield (Pa.), Girard Junction, Erie, Fredonia, Silver Creek (N. Y.), Buffalo.—Ed.]

Wrought iron and steel increase in tensile strength with increase of temperature up to 500° Fahr. Cast iron becomes perceptibly weaker at 200°, and at about 1,000° it has about one-third its normal strength.

NEW VEHICLES AND PARTS.

The Dietz Lucifer Acetylene Gas Lamp.

After confining themselves to oil lamps for many years the R. E. Dietz Company have just brought out an acetylene gas lamp for automobiles. In this lamp the water feed, instead of being by drops at the centre of the carbide holder, is distributed over the whole circumference thereof. It is claimed that, owing to the large surface of attack of the water on the carbide, at no time has the water to soak through a deep layer of slack to reach the carbide, and the light is therefore practically uniformly intense from first to last of one filling, whereas with a drop feed at one spot after the lamp has burned for some hours all the carbide around the feed becomes exhausted and the water has to soak some distance through slackened carbide, which results in reducing the flame. The system of water feed employed is known as the capillary film feed and is claimed to permit extremely close regulation, allowing no excess of water to go into the carbide, thus reducing the waste of carbide by the continuation of gas production after the water is turned off.

The lamp is constructed of heavy gauge brass. The top of the carbide chamber screws on and has a nut on top to turn with a wrench. In the top of the screw is a thick gasket of pure rubber. The reflector is of heavy gauge aluminum, which is claimed to give a much higher reflecting power than nickel. The focus is adjustable and the light is said to be so strong that a newspaper can be read at a distance of 400 feet.

A New Duryea Vehicle.

The cut herewith shows a recent Duryea design, built to the order of a customer. It has the standard Duryea mechanism and one hand control, but the body is longer at the rear, and is equipped with

Duryea Phaeton with Mercedes Front.

an imitation Mercedes front. The long wheel base and low centre of gravity insure a comfortable and steady running vehicle. The weight is 1,100 pounds, and the horse power of the motor is claimed to be from 10 to 12.

Westinghouse Automobile Charging Outfits.

Electric automobiles, as is generally known, require facilities for recharging the batteries. The charging current may be derived from any one of three sources—direct current lines, alternating current lines and independent power plants. It has been found that there is a demand for outfits charging one, two, four and twelve batteries simultaneously, and this, together with the three different sources of current, admits of 168 different combinations, each calling for a different design of charging board.

It is hardly worth while to repeat that the efficiency of the electric automobile depends largely upon the care given to its battery. The charging of the battery is often looked after by those unfamiliar with the requirements, and it is therefore important that the charging outfit be so designed that only the least attention is required and there is little opportunity for neglect and abuse of the battery. These conditions are said to have been kept in view in the design of the charging outfits of the Westinghouse Electric and Manufacturing Company, of which some photos are shown herewith.

The garage outfit, Fig. 1, possesses the advantage that all the controls are at one point, thus minimizing the attention required, and that only one voltmeter and one ammeter are used, instead of twelve instruments of each kind, as in earlier designs of such outfits. The charging may be done serially or simultaneously. The cut shows one of these garage switchboards with the series rheostat for controlling the charging rates of the various batteries installed below it. In this particular case rheostats are provided for eight vehicles, the greater capacity being obtained at any time by adding the requisite number of rheostats.

Each switch on the board is numbered to correspond with the number of its rheostat and charging stand. The throwing of a switch to the left places a battery in "charge"; throwing it to the right connects the ammeter so that the current may be read. The voltmeter will indicate for the whole main line, or by pressing the push button corresponding to any switch the voltage reading of its stand can be taken. A separate push button gives the voltage reading on the line beyond the rheostats. Opposite each switch is a numbered hook upon which the charging record of the battery may be kept.

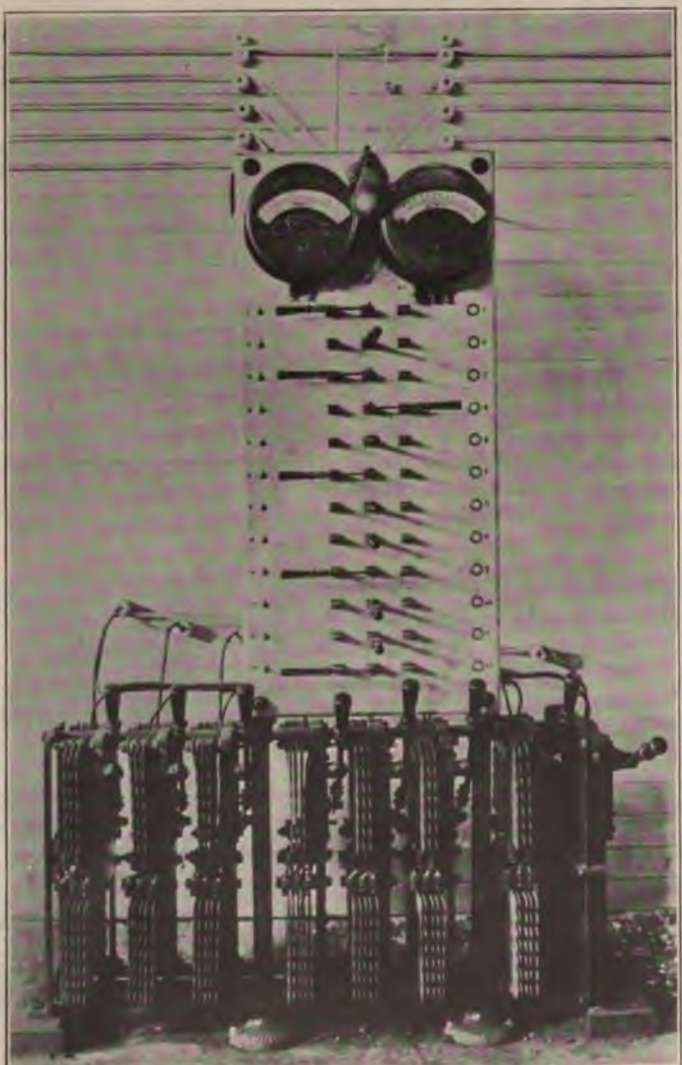


Fig. 1.—Garage Charging Outfit.

In connection with this central switchboard automatic circuit breakers and fuse blocks are used at each charging stand. These switchboards may be connected with any 125 volt, direct current line, whether from central stations, motor generator set or independent circuit.

For the one or two vehicles of the private owner or the small garage designed for four machines the panels are as shown, with the necessary modifications in each case, and are adapted for direct current voltage of 110 to 125. For single battery charging the automatic circuit breaker (Fig. 2 on the left) is mounted directly upon the panel with the metres and fused switch. Where two or more automobiles are to be charged the circuit breakers are displaced by switches, and the overvoltage circuit breaker and fuse blocks are located at the carriage charging stands.

The details of the outfits are of standard Westinghouse make, and are as follows: The panels, of white Italian marble or marbleized slate. The meters, which for private use may be a combined voltmeter and ammeter, are provided with sub-scales and convenient terminals for reading voltages of individual cells, with volt scale from 0 to 150, sub-scales 0 to 3, and ampere scales 0 to 100. The switches are of standard Westinghouse type D, of the normal capacity of 50 amperes for each charging circuit, the line switches being fused. It is claimed that the circuit breakers, under normal circumstances, automatically cut out the battery when the charge is completed, and in all cases protect the battery from any overcharge danger or damage, enabling the owner or attendant to set the charge and pay no more attention to it until the machine is again wanted for use, without loss or damage of any kind. The motor starter rheostats, employed in starting the direct current motors, are mounted on the back of the panels, with handle projecting through, the same as with the generator field rheostats. Where a generator is employed the latter are used for the regulation of the battery charging of one carriage, without requiring the additional series rheostats of the grid or embedded type. Where the series rheostats are needed they are made in one of three types—grid, embedded or combined. In the first form they are mounted on the floor directly below the switchboard, the grids being of cast iron, set in the open air, thoroughly ventilated, and while they are normally made to carry 60 amperes each they can be greatly overloaded without injury, it is claimed. The embedded type of rheostat is in two styles, designed for use with either 10 to

›r 20 to 24 cells, when charged from 25 volt line, will carry continuously amperes, and may be mounted with ›ral of the same type or with the grid .

ne of the greatest advantages of these its is that they have no loose wires, doing away with danger from fire. rom ignorance or carelessness, a mis- is made by the operator, the fuses ›ly the deficiency by cutting out the ent, obviating injury to the batteries ›witchboard. The panels for private measure 14 inches by 28 inches by 1¼ es thick, those for public garages 22 es by 48 inches by 1¼ inches.

ıe direct or alternating current motor ›rators furnished by the Westinghouse tric and Manufacturing Company are andard type and adapted to the panel , transforming high voltage direct ent to the proper voltage, or changing nating current to the desired voltage, ›t current for charging.

cases where the owner prefers his isolated plant for generating the ging current, by means of a gas or r engine, accessory apparatus to con- the charging under these conditions dded. In regard to the outfits of ›us capacities it may be said that out- or charging one or two machines are ıded for private use, that with a ca- y of four is suitable for clubs, coun- houses or small stables, while the lard twelve service is applicable for use by public garages, express and cab companies or other establishments having a number of vehicles.

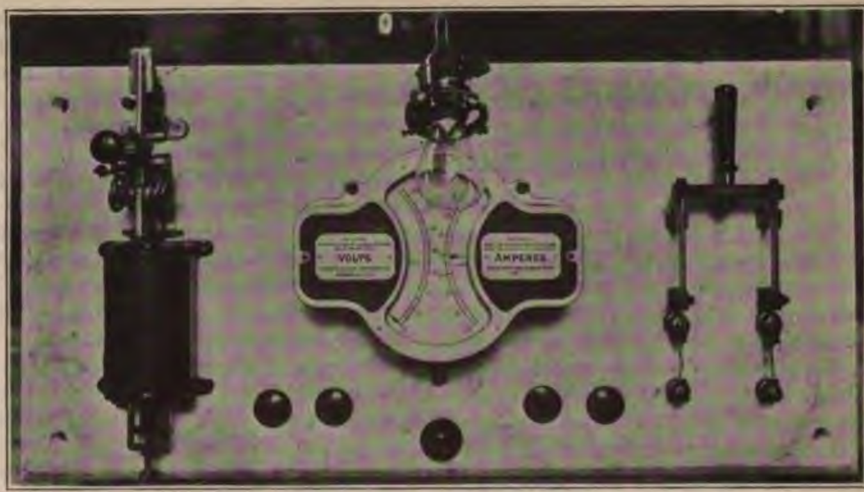


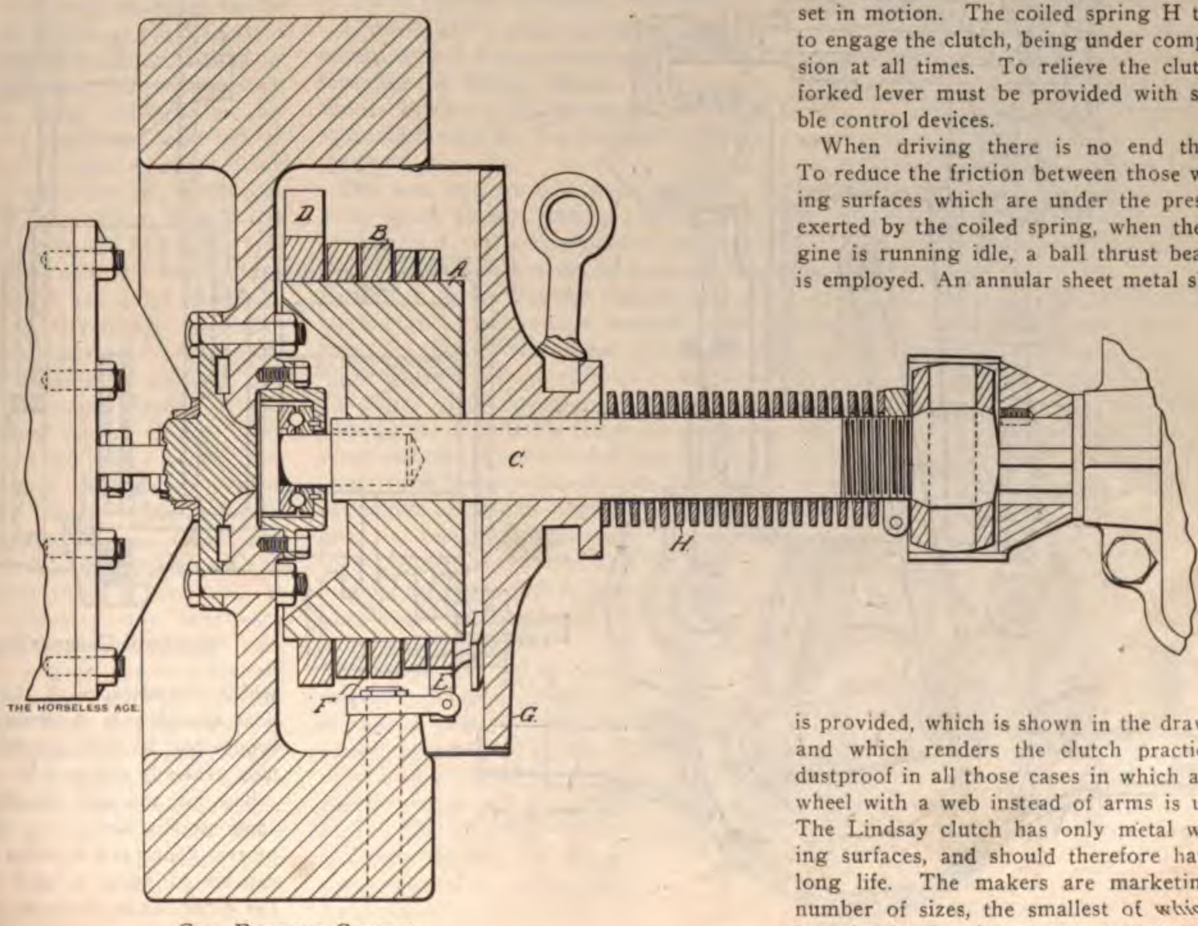
FIG. 2.—PRIVATE SWITCHBOARD FOR CHARGING SIMPLE BATTE…

The Coil Clutch Manufacturing Company's Friction Clutch.

The accompanying cut illustrates the friction clutch of the Coil Clutch Manufacturing Company, 45 Broadway, New York, as applied to a four cylinder gasoline touring car of a well known American make. This clutch is now being manufactured for automobile use under the Lindsay patents.

In the illustration the flywheel is shown bolted to a flange that is integral with the crank shaft. The clutch members proper are the drum A and the coiled steel band B. The former is keyed to the shaft C, while the latter rotates with the flywheel as long as the engine is running. The coil is rolled up hot after two ears have been forged onto it, one at either end, and then it is bored out. The ear D abuts against a hub or similar projection (not shown) of the web of the flywheel. The other ear E is the one that is controlled by the bell crank F. When the disk G bears against the bell crank the coil is twisted slightly and grips the drum A. The shaft C is then set in motion. The coiled spring H tends to engage the clutch, being under compression at all times. To relieve the clutch a forked lever must be provided with suitable control devices.

When driving there is no end thrust. To reduce the friction between those wearing surfaces which are under the pressure exerted by the coiled spring, when the engine is running idle, a ball thrust bearing is employed. An annular sheet metal shield is provided, which is shown in the drawing and which renders the clutch practically dustproof in all those cases in which a flywheel with a web instead of arms is used. The Lindsay clutch has only metal wearing surfaces, and should therefore have a long life. The makers are marketing a number of sizes, the smallest of which is intended for a 10 horse power motor.



COIL FRICTION CLUTCH.

...OUR... FOREIGN EXCHANGES

The Minerva Two Cylinder Motor.

The two cylinder 12 horse power motor built by the Société Minerve, of Billancourt, near Paris, France, is of 100 millimetres cylinder bore and 120 millimetres piston stroke. The cylinders are arranged vertically, twin fashion, and the two pistons work on crank pins set at 180 degrees. The normal speed is said to be 1,200 revolutions per minute. Each of the two cylinders is cast separately, but integral with its jacket and cylinder head. They are machined, and then bolted together. It is claimed for this construction that in case one cylinder should become defective from any cause only that one needs to be thrown away. Besides both cylinders are completely enveloped with cooling water, thus insuring uniform cooling of the walls.

The cylinders are bolted to a crank case which is divided in a horizontal plane through the centre of the crank shaft. The lower half is cast with two brackets for fastening the motor to the false frame of the car.

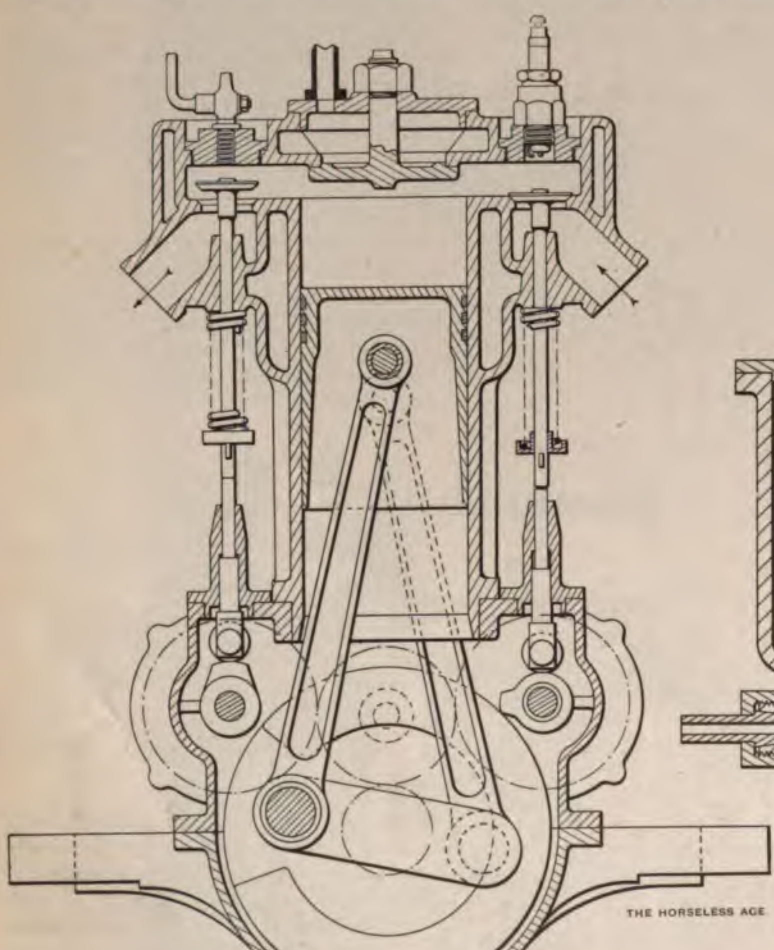
Both intake and exhaust valves are operated mechanically, and are located in valve chambers on opposite sides of the cylinders. They are identical in every respect, and therefore interchangeable. It will be seen that the valve chambers are completely surrounded by the water jacket, and that the intake and exhaust pipes have a 45° joint with the valve chambers. The cams and cam shaft gears are inclosed within the crank case. The gears on the two cam shafts are driven from the crank shaft pinion through an intermediate gear. The valves are lifted through the intermediary of push rods with cam rollers.

The clear diameter of the valves is exactly one-third the diameter of the cylinder bore. The valves are made of nickel steel, and as the valve seats are completely surrounded with cooling water, grinding of the valves is said to be rarely necessary. The clearance between the valve stem and the lifting rod is 1 millimetre, or .040 inch. The spark plug is placed directly above the intake valve and the compression cock on the opposite side of the cylinder, over the exhaust valve. Much care has been given to the balancing of the moving parts. Counterweights are placed upon the outer crank arms to give complete balance in the vertical plane, and also for the purpose of facilitating the lubrication. Attention should be called to the method of closing the cylinder head. A circular plate introduced into the cylinder from below bears against the interior wall of the cylinder head, and is pressed up against the surface by means of an upwardly extending stem, a circular plate bearing against the outer wall of the cylinder head and a hexagon nut. The circulating water connection is made to the upper plate.

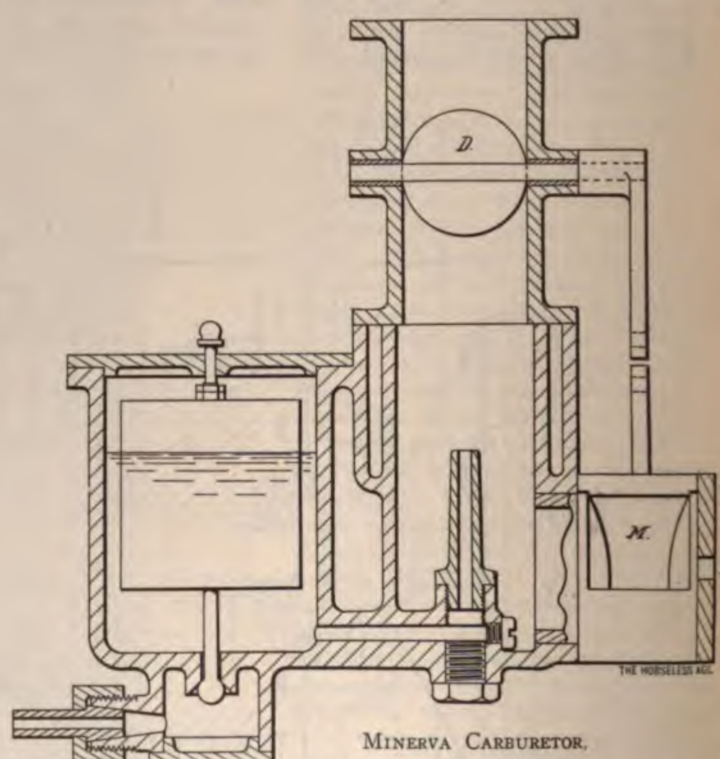
The motor has jump spark ignition, the commutator being placed upon the end of the exhaust valve cam shaft. No trembler is used, but a new system of which no complete details are yet given out, which comprises a device called a vibrator which is interposed in the primary circuit. It consists of a vibrating plate not unlike the diaphragm of telephones, which transforms the primary current into a series of undulations. There is, therefore, no complete interruption of the current, but only a rapid variation of its strength. One of the principal advantages of this method is the suppression of sparks in the primary circuit.

Upon the end of the intake cam shaft is located the centrifugal governor. To the fork of this governor are connected two links, one of which connects to the butterfly valve D of the carburetor, and the other to the lever C of the register valve A.

The carburetor is of the spraying type, and maintains a constant level by means of a float. The mixture of gasoline vapor and air is said to remain constant within wide limits of engine speeds. The valve by



Minerva Motor.



Minerva Carburetor.

which the entrance of the gasoline to the float chamber is controlled consists of a bronze ball fixed to the float by a rod running centrally through it.

The air and gas throttle valves present some peculiarities. The air valve consists of two concentric cylinders of bronze, one capable of being rotated with relation to the other. The stationary cylinder is provided with three openings, two M of trapez

in its cylinder wall, and a circular
in the centre of the head. The mov-
ylinder is provided with two rectan-
openings capable of registering with
apeze form openings in the stationary
er, and with a lever arm for moving
and its centre. This lever arm is con-
to the centrifugal governor. The
le cylinder is adjusted in such a man-
at when the motor is not running the
e form openings are entirely closed.
the motor is being started air is
in through the small central opening
y. As soon as the motor runs up to
however, the circumferential open-
re opened more and more, and when
num speed is attained they are com-
open. The trapeze form has been
d for these openings in order to ob-
t all speeds such a degree of throt-
hat the vacuum produced around the
draws in a proper proportion of
ne. The mixing chamber is sur-
ed by a jacket through which the en-
cooling water is circulated.
gas throttle valve is simply a butter-
ve arranged in the tube surmounting
xing chamber. It is operated through
m and gear sector.

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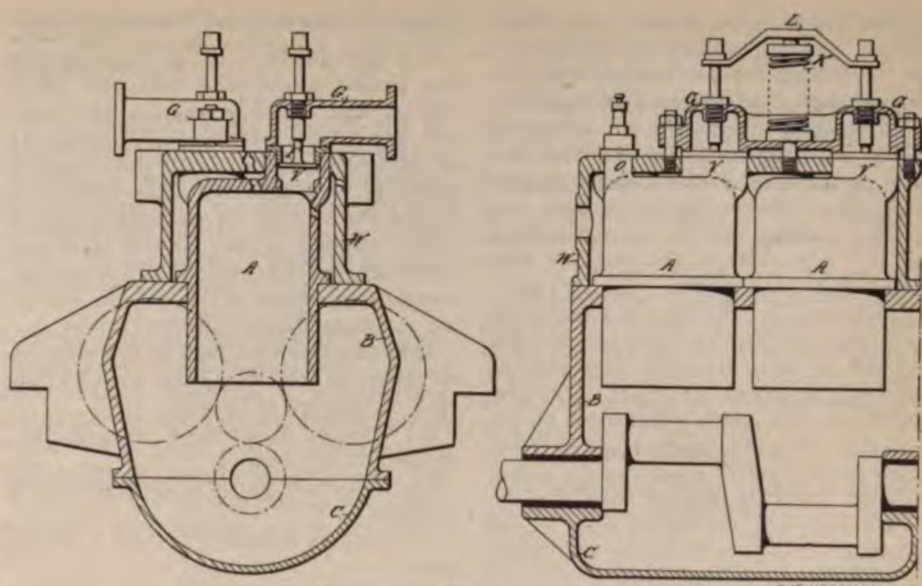
gine with Aluminum Water Jacket.

. Rolls and C. R. D'Esterre, of Lon-
ave designed an engine of the four
er vertical type in which cast liners
serted in aluminum jackets. In the
gs herewith the liners are designated
and the aluminum jacket casting by
oth the liners and the jacket casting
lted to the upper surface of an alu-
casting B forming the upper half of
nk case B C. In the top of the jacket
holes are made through which pass
lve ports V and sparking plug bosses
ch project above the liners A. This
W together with the liner A and
per surface of the crank casing B
constitute a continuous watertight
around each pair of the cylinder
A. The crank shaft bearings are
d half in the upper casting B and
n the bottom casting C, the latter
g an oil containing trough into
the connecting rod ends dip at each
tion of the engine. The valves F
the cone seated type. Over each
f these valves—two suction and two
st valves—is placed a cover G in
are two chambers, one over each
Extending horizontally from each
chamber is a short pipe to which are
the suction pipe and the exhaust
espectively. Each pair of valves is
lled by a single coil spring K and
piece L. The practicability of this
arrangement is rather questionable.
e not informed as to how the water
between the valve and spark plug
and the jacket casting are made
but it will be noticed in the drawings



Rolls and D'Esterre Engine.

that the head of the jacket casting is made extra thick.

The valve gears and cams are all inclosed in the crank casing. The valves are raised from their seats by a direct downward pull of valve rods extending parallel with the cylinders and guided in holes in the crank case and in lugs extending from the upper part of the jacket casting. To the upper ends of these rods are fastened arms, the outer ends of which are located over the valve stems.

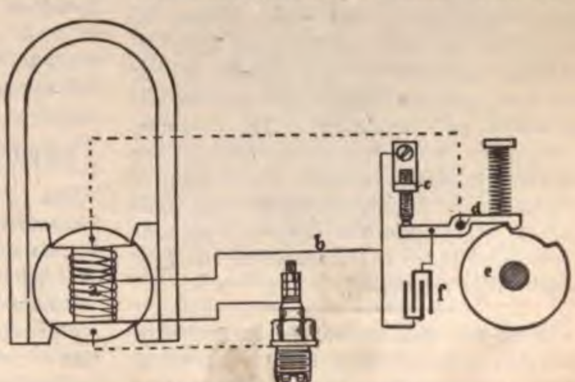
New Bosch Ignition System.

A novel and highly interesting ignition system is hailed from Germany. It is the invention of Robert Bosch, of Stuttgart, already known in the automobile world in connection with the Simms-Bosch ignition apparatus.

The new system is a high tension or jump spark system, but it entirely does away with a coil and produces an arc of considerable duration in the cylinder, instead of a single impulse lasting only an infinitesimal fraction of a second, resembling in this latter respect the hammer break ignition system. In fact, it has been the object of the inventor to combine the good points of both the jump and hammer break systems and overcome their bad features. The hammer break system as now used with the Bosch magneto gives a very hot and sure spark, but the mechanism with a four cylinder engine is quite complicated and its noise is frequently objected to.

To attain the end in view a magneto is used which, by means of a mechanically operated controlling device of very simple form, generates electric impulses of peculiar form. The terminals of the armature winding are directly connected to the spark plug. At a certain point in the revolution of the moving part of the magneto the E. M. F. induced in the armature winding suddenly rises to a value which allows a spark to jump across the gap of the plug. The E. M. F. generated in the armature then drops, but instead of falling to zero, as in the secondary of a spark coil, it is maintained for a considerable time, and as the spark or disruptive discharge has formed an arc between the spark terminals and thereby greatly reduced the resistance of the circuit, the current continues to flow and the arc is maintained for an appreciable period, the same as with a hammer break system. The sudden momentary impulse of E. M. F., which causes a spark to jump between the terminals of the plug, performs the function performed in hammer break systems by the contacting mechanism, the starting of the arc. The essential difference between this system and the ordinary jump spark system is that the E. M. F. in the circuit is maintained after the arc between the contact points has once been established.

The magneto is of the ordinary type, comprising several permanent steel field magnets and an H armature core. The armature winding is divided into two portions, one of heavy wire and the other of fine wire. The two windings are connected in series, the outer end of the heavy wire winding being grounded. Two con-



Sketch of Bosch Ignition.

ductors lead from the magneto (for single cylinder ignition, as illustrated in Fig. 1), one connecting the junction between the two windings to an insulated contact screw *c* and the other connecting the outer end of the fine winding to the insulated terminal of the spark plug. The dotted lines in the illustration represent ground connections, showing that the contact lever *d* and the outer shell of the plug are both grounded to the magneto.

The lever *d* is operated by a cam *e* on the magneto shaft and a coiled spring. The cam will be seen to consist of a circular disk, with a groove at a part of its circumference, into which a projection on the end of the lever *d* is pressed by the coiled spring when it comes around to the proper position. Then the contact lever *d* establishes contact with the contact screw *c*, and thereby short circuits the heavy wire winding of the magneto armature.

At this period the flow of magnetism is about to increase through the armature core. As soon as a certain magnetic flux passes the core a strong current is induced in the short circuited armature winding, which, by setting up a magnetic field of its own, keeps the regular armature flux down. At the proper moment the contact at *c* is broken, the short circuit of the armature ceases and this leads to such a rapid increase in the flux of magnetism through the core that the voltage induced in both armature windings is sufficient to cause a spark to jump across the plug terminals. The arc thus established will continue so long as the voltage is kept up by the magneto. A much hotter spark is therefore produced than the ordinary jump spark, and this necessitates special spark plugs, as the points of the ordinary plugs would be burned away in short time.

The spark plugs are made with multiple spark joints, thus dividing the spark. They are insulated with mica, and the central terminal is held in place by an insulating core of soapstone. It is claimed that this plug has proven very satisfactory, and does not show any deterioration by burning at the spark points. At present these magnetos are made only for four cylinder engines. They are of the rotating kind (as distinguished from the oscillating type) and start the motors without battery. The armature itself is stationary, the rotating part being a sort of magnetic bridge, as in the former Bosch magnetos. The rotating part is driven at the speed of the cam shaft or half the speed of the crank shaft, and in the four cylinder igniter four sparks are produced per revolution. The commutator wheel is fastened to the shaft of the rotating magnetic bridge. The system is certainly very simple, the connections comprising only four cables running from four binding posts on the magneto to the four spark plugs respectively.

In the non-stop trial of the Scottish Automobile Club, to be held May 13 to 14, there are twenty-five entries, ranging from 6½ to 30 horse power.

English Commercial Vehicle Trials.

The Automobile Club of Great Britain and Ireland proposes to hold next fall a trial of light delivery wagons, and some time ago called a meeting of representatives of business houses to learn their requirements in this direction. The trials also formed the subject for consideration at a recent meeting of the Society of Motor Manufacturers and Traders, and it was determined to submit to the club the following recommendations for these trials:

The route traversed shall be the same for all classes of vehicles. There shall be four class of vehicles, as follows:

(a) Vehicles designed to carry 5 hundredweight or under.

(b) Vehicles designed to carry half a ton or under.

(c) Vehicles designed to carry 1 ton or under.

(d) Vehicles designed to carry 2 tons or under.

Vehicles may be entered by manufacturers or agents only, and the competition to be international. Not more than two vehicles of the same make may be entered in any one class. The floor area shall be limited in each class. The trials shall be over a distance of 1,200 miles, to be covered in four weeks.

The judges not to be members of or interested in the trade, one-half of them to be engineers and one-half commercial men. The official observers to confine their duties to making observations and reporting to the judges, but not to deduct marks on their own initiative, this presumably being left to the judges.

All vehicles to be stored at depots provided by the club in or near London. All vehicles to carry the full declared load during the whole time. The working cost per ton mile to be taken into consideration in making the awards. Selling price to be taken into consideration.

Among other items to be taken into account in making awards are the positions of the driver and his ability to see the road, accessibility of gear and mechanism, brake power and appearance. Every vehicle to be finished in the usual style for its class. Cars to run five days in each week, but may be overhauled and adjusted on the sixth in the club depot; all repairs and renewals to be noted. One hour to be allowed each night for cleaning, adjusting, etc., and one hour in the morning. All beyond this to count against the vehicle. Hill climbing tests to be arranged.

Import Duties on Automobiles.

The following are the import duties on automobiles in European countries and British colonies, according to the Board of Trade Journal:

Russia.—Vehicle and power equipment are charged for separately, the former at a rate varying between $34 and $112, according to size, and the latter at $3.05 per hundred pounds. If it is impossible to separate vehicle and motor the weight of the latter is taken as 30 per cent. of the whole and charged for accordingly.

France.—The system is similar to that of Russia, motor and vehicle being taxed separately, but when these are inseparable the goods car counts as all motor (charged for at the rate of $1.08 to $7.22 per 100 pounds) and the pleasure car as all carriage (charged 54 cents to $10.83 per 100 pounds).

Italy.—The same system; carriage, $7.46 to $58.70 per 100 pounds; motor, $1.08 to $2.26 per 100 pounds.

Spain.—Rates the same as for carriages, $12.50 to $40 per 100 pounds.

Austria.—The tariff is based on the upholstery of the carriage and the percentage of metal, having an intrinsic value, in the motor. A car with leather work or upholstery costs $38, as against $12 without, and in addition a motor containing less than 50 per cent. of valuable metal costs $2.68 per 100 pounds, as against only $1.10 to $1.77 for the more valuable article.

Germany.—The rate is 90 cents per 100 pounds gross weight.

Switzerland.—$1.81 per 100 pounds for pleasure cars and 53 cents per 100 pounds for business vehicles.

Norway.—$1.90 per 100 pounds.

Belgium.—Twelve per cent. ad valorem, but nothing is charged for cars of travelers visiting the country.

Portugal.—$135 per vehicle.

British possessions charge as follows: Free — Straits Settlements, Hong Kong, Falklands, Gibraltar and Malta. India, 5 per cent. ad valorem; Ceylon, 5½ per cent.; Transvaal, 3 per cent. transit duty and 7½ per cent.; Canada, 16⅔ per cent. Twenty per cent. ad valorem—Cape Colony, Natal, Orange River Colony, Australia and New Zealand.

The city of Freiburg, Switzerland, has agreed to pay a subsidy of $1,000 to a company proposing to establish a motor omnibus service to some of the outlying districts.

It is estimated that $5,000 will be necessary for road repairs on the Gordon Bennett route. On April 6 the subscriptions to the road fund amounted to $3,250, and on that day a supplementary subscription list was opened.

Since the beginning of April a De Dion steam omnibus has been in service between Troyes and Tonnerre, France, a distance of 36 miles, which is covered in less than four hours. There are five principal stations on the route at which stops are made.

Popular lectures on automobiles are becoming quite common in England. The first of the Cantor lectures at the Society of Arts, London, scheduled for April 27, was on "Mechanical Road Vehicles," by W. Worby Beaumont, and on May 8 Mervyn O'Gorman will deliver a lecture at the Westminster Town Hall on "The Motor

Its Most Economic Use, Its Con-
ion and the Immediate Future Prob-
Before It." .

;arage for the accommodation of about
autocars has been provided at the
Cecil, London.

am tractors may now be seen in the
morning hours in Piccadilly, London,
ng behind them large loads of vege-
.

: local government of the province of
swig-Holstein, Germany, has made a
ation prohibiting the use of the signal
on all vehicles except automobiles.

London firm advertises in a French
mporary for "ladies accustomed to
z motor cycles," offering a four
hs' position. "Please state age and
ience."

notor cab service on a taxameter basis
be established in Paris by M. de Cren-
The lowest fare is to be 10 cents for
le. The charge for two hours will be
id for the whole day $2.50.

e entries for the commercial vehicle
of the German Agricultural Society
prise one tractor with trailer for the
portation of raw materials and three
s for the transportation of packed
s and milk.

e Austrian Automobile Club proposes
old a contest under the following con-
ns: Entries will be limited to small
cles selling for less than $630. Two
ths before the contest a subscription
be opened among persons who agree
iy a vehicle of the winning type. The
est will only take place if twenty-five
ore subscriptions are obtained, so that
vinner in the contest will receive as an
d orders for at least twenty-five vehi-

ie A. C. G. B. and I has decided to
a postal vote on the legislative ques-
among its members. They will be
d to state whether, in return for three
essions—viz., the abolition of the spe-
speed limit, the alteration of the law
egards furious driving and the altera-
of the tare limit—they are in favor of
ification of motor cars by means of
bers or names conspicuous when the
are in motion. In a second question
will be asked to say whether they are
avor of nothing further being done by
club at present.

. Ernest Archdeacon, the well known
orist, while cycling in the Champs
ées, Paris, on April 19, was run down
an automobile. He escaped unhurt,
his bicycle was broken up. The mo-
its, who had pulled up, thought they
: about to have a trying time, but to their surprise M. Archdeacon quietly said: "Get away, before the police come; we should both waste our time."

A movement has been inaugurated by British automobilists to place their cars at the disposal of hospitals on days when they are not using them themselves to take convalescents and nurses out for a country drive. The idea is encouraged by the "Automobile Club Journal."

"During the terrific storm which swept Germany on April 19 the motor car of Duke Adolph Frederick of Mecklenburg was caught by the gale and dashed against a tree with so much violence that the duke was thrown out and the car smashed." The storm was undoubtedly due to the motor working on full throttle and on the fourth gear.

The entries at the ordinary fees for the Paris-Madrid race closed on April 15 at 6 o'clock, and in all 280 competitors had inscribed their names on the list. Some three or four are doubtful starters, but the following entries are said to be sure runners: Heavy cars, 105; cars, 62; voiturettes, 48; motor cycles, 59; total, 274. The total sum of the entrance fees reached $14,630.

In September last some Monte Carlo roads were oiled with petroleum, others were tarred. All traces and good effects of the oil have long since disappeared. The tarred section shows such excellent results that the Prince of Monaco has decided that all the streets and roads of the principality (about 60,000 square metres) are to be tarred, and dust and mud thus permanently banished. Many distinguished automobilists were present at the tarring of roads at Monte Carlo, the process costing only 8 centimes per square metre. This system may be adopted all over the Riviera.

Experiments recently made indicate that boiler pitting can be obviated by means of graphite and oil. In a certain boiler the mud drum was found to be pitted. The drum was cleaned and scraped, after which it was painted with graphite mixed with cylinder oil. Measurements of the depths of the pits were taken, and six months after they were no deeper and no new ones were found. If the plumbago could be applied to the interior of the boiler in such a way that it would stay it is quite likely that it would prove a remedy. At the same time another advantage would accrue from its use, as the scale would be easily detached if there was a layer of plumbago below it. In another case cited by the *Engineering News* a pair of cylindrical boilers, occasional applications of cylinder oil (mineral) and plumbago have kept back corrosion on a trial of six months. Boilers were new when plumbago was used. The boilers, which the new ones replaced, were thrown out rotten from corrosion. The feed was mine water, as nothing else could be had. The use of oil in a boiler will, however, not commend itself to most engineers.

A dispatch from Genoa states that an unfortunate occurrence has marred the motor car trip through the Riviera of the Princess Murat, her vehicle having run over and killed a man. The tour has been abandoned.

The *Autocar*, our English contemporary, proposes to arrange the signaling of cars in the Gordon Bennett race as they pass certain points upon the course by means of a captive balloon, weather conditions permitting.

The number of prizes offered in connection with the Gordon Bennett Cup race is increasing. The latest addition to the list is a motor fur coat, which the committee has decided to award to the mechanic of the winning car.

In June next a motor exhibition will be held at Frankfort, in the fête hall which has been specially erected for the great singing tournament of the German choral societies, on which occasion the Kaiser will be present. This event immediately precedes the automobile show.

A motor omnibus service is shortly to be started by Lord Leitrim between Strabane and Letterkenny, Ireland, by way of Kilmacrenan and Milford, to Rosapenna Hotel. The cars are being built to accommodate fifteen persons, with luggage, and will run in connection with all trains reaching Strabane.

During the Nice week an unofficial match in renewing detachable tires took place between two mechanics, Sersiron and Adolphe. The feat consisted in removing four 870x90 millimetre (about 36x3½ inches) tires from the wheels of a vehicle, putting on new ones, pumping up and starting the car. Sersiron won in 26m. 23s., Adolphe requiring 27m. 30s.

The French automobile manufacturers most interested in the International Cup Race have chartered a special vessel, the Ferdinand de Lesseps, of 3,600 tons and 375 feet long, to carry the French participants and visitors and their machinists to Ireland, leaving Havre on June 27. The boat will be the French headquarters at Dublin during the Irish fortnight.

Baron Henri de Rothschild was condemned on March 6 to pass a day in prison for driving an automobile at excessive speed on December 5, 1902, near the Porte Maillot. He appealed, and the sentence has just been confirmed before a correctional court. The baron is expected to derive some consolation from the judge's assurance that imprisonment in matters of contravention is annoying but not dishonorable.

Speed Excesses and Public Feeling in England.

Laws do not make men virtuous, and excessively severe laws will not kill the speeding evil. Undoubtedly the most restrictive automobile law in any civilized country is that of England, yet nowhere is there so much complaint in the public press against furious driving as in Great Britain. A French automobilist who visited England on the occasion of the recent Crystal Palace Show, on returning said, although the law limited the speed in England to 12 miles per hour, there was absolutely no evidence of it being observed, as the cars were being run on the highways at the same speed as in France.

Last year a very lengthy discussion of the "motor problem" took place in a Scottish paper, we believe the Glasgow *Times*, and recently the London *Express* printed very extensive correspondence on the subject, from which the following extracts may be of interest:

"Can nothing be done to check the growing evil of inconsiderate motor drivers who transform their cars into a source of serious danger to the public, as well as to themselves and their passengers, by driving at an excessive rate of speed through narrow and even tortuous village streets?

"I should like, at the outset, to say that I am not an anti-motorist, being the owner of several cars, which I drive myself, with, I hope, due consideration for other people.

"The necessity for some action was brought very forcibly to my mind by an incident which I witnessed. In a narrow, twisting street, which runs through a little Sussex village, one motor car passed another. The driver of the car that was passed at once put on speed, evidently with the intention of wiping out what he considered to be an insult.

"The driver of the other car was apparently equally determined to keep front place, and they raced along a road which twists and turns between houses so that one can never see more than 30 or 40 yards ahead, and at the end of which is a right angle turn.

"The roads were dusty, and the second car was consequently enveloped in a dense cloud of dust, raised by the first car.

"The first car turned the right angle corner safely, it is true, but at a rate of speed which was in the highest degree dangerous, both to its occupants and to anyone who happened to be on the road.

"The driver of the second car did not see the corner, owing to a cloud of dust in which he was driving, and dashed through a substantial iron paling into the wall of a house. None of the five occupants of the car were seriously hurt, but the car was badly smashed.

"Had there been a cart coming round the corner, a group of children playing by the roadside, or in fact anybody about, a terrible fatality must have occurred, for naturally no one expects a motor to dash straight past a turning into a wall.

"Both cars were of high power, and I am sure I am not exaggerating when I say that the speed at which they rushed along the narrow street which I have described was not less than thirty-five miles an hour."

Another correspondent writes as follows:

"If you can persuade the scorcher to mend his ways you will do a service to the whole community of motorists, who now have to suffer for the sins of a few.

"License all drivers, amateur or professional, and make them pass through a sufficient test of ability before you grant the license. Register all cars, and fix the identification card in some inconspicuous place, say under the cushion of the driver's seat. Then watch out for the real scorcher, go to any trouble to catch him, and make an example of him when caught.

"The scorcher would not last long under these conditions, and when he was abolished the authorities could, with a clear conscience, revise that absurd and antiquated rule about 12 miles an hour in open country—a rule about as wise and as useful as would be one restricting a foot passenger to 2 miles an hour across an open moor.

"There are a few notorious scorchers on the road—good drivers, but reckless to the last degree. One of the most notorious bears a name very well known in motoring circles. It ought not to be difficult to restrain him and a few more of his kidney."

A motorist writes to the effect that a good deal of the bad feeling is due to public prejudice and is unfounded.

"I am a motorist and own to a certain fondness for fast driving. There are two sides to every question.

"There is a lot of fuss about improper speed and the need for legislation, but the fault does not lie wholly with the motorist. Whenever he kills a chicken on a country road he is the target for abuse, if not a lawsuit.

"I killed two hens in Sussex the other day, and the owner wanted to break up my car. If he kept his chickens at home they would live longer, and everybody would be happier. There is no harm in high speed in the open country.

"Motoring embraces a variety of enthusiasts—reckless as well as careful. The latter should not suffer for the man who scores an occasional victim in the public highway through pure carelessness. Give the careful man a chance."

The Auto-Cycle Club, the new body which has been formed in England to govern motor cycle racing, has resolved upon classifying the machines on a different system from that which has hitherto obtained. Standards expressed in terms of "horse power" and "cylinder capacity" have been rejected in favor of a "weight" classification. The first class will be for machines weighing not more than 70½, the second not more than 114½ and the third not more than 176½.

Club Notes.

CHICAGO A. C.

The first of the season's runs of the Chicago Automobile Club occurred on April 19 to Highland Park, Ill., a distance of 25 miles.

SPOKANE A. C.

It is said that an automobile club will probably be formed at Spokane, Wash. There are about twenty-five machines in the city at the present time.

OAKLAND A. C.

The Oakland (Cal.) Club has been organized with the following officers: President, Dr. N. H. Chamberlain; vice president, Dr. G. W. Rodolph; secretary, F. F. Weston; treasurer, R. J. McMullen.

A. C. OF CALIFORNIA.

The Automobile Club of California, San Francisco, held its first run of the season on April 19. It was to Haywards. At Oakland the members were joined by automobilists from Berkeley, Alameda, Oakland and Mountain View, and at Haywards by a large detachment of San José automobilists.

A. C. OF MAINE.

At the recent complimentary banquet, before noted in these columns as having been tendered at Riveton Park on April 24 to Charles P. Hatch upon his voluntary retirement as secretary of the Automobile Club of Maine, Portland, ex-Judge Enoch Foster, on behalf of the club members, presented Mr. Hatch with a gold lined silver punch bowl and a set of cut glassware.

L. I. A. C.

The Long Island Automobile Club adopted resolutions at its last meeting condemning the Doughty-Bailey bill and protesting against its approval by Governor Odell. This completes the list of protesting organizations. Every automobile club in New York State has gone on record as opposed to the measure.

NEW YORK STATE A. OF A. C.

At the organization meeting of the New York Association of Automobile Clubs at Syracuse, N. Y., a resolution was adopted protesting against the action of the Automobile Club of America in favoring the Doughty-Bailey automobile bill, and declaring that the latter club had no right to speak for all the automobilists of the State in accepting the measure. The resolution says in part: "It is our unanimous opinion that the bill is harmful, and would work untold injury to the auto industry without effecting the reforms it aims to bring about; we deny and protest against the assumption implied in the measure, namely, that all automobilists are predisposed to break the law, and as such are subjected to quasi criminal legislation, and we protest against the assumption of the A. C. A. in

ıg the bill in the name of the auto-
ts of the State as unwarranted."

NEW YORK STATE A. OF A. C.

officers of the recently organized
ork State Association of Automo-
ıbs are as follows: President, Dr.
ı E. Milbank, of the Albany Club;
e president, William Horace Hotch-
the Buffalo Club; second vice presi-
arry S. Woodworth, of the Roches-
b; third vice president, Albert J.
of the Utica Club; secretary and
ːr, Frederick J. Elliott, of the Syra-
ub.

MINNEAPOLIS A. C.

l climbing contest is being planned
Minneapolis Automobile Club. For
itest a new style of classification has
ranged. The price of machine, in-
its weight or power, will determine
s. The first division will consist of
which cost $1,000 or less; second
1,000 to $1,500; third class, $1,500 to
fourth class, $1,750. Two machines
rt at the same time, the standing
ing the rule for all classes. After
test the club will take a run to the
hda Club and around the lake bou-

N. Y M. C. C.

New York Motor Cycle Club will
hill climbing contest on May 30, on
erdale Hill on Riverdale avenue, in
New York city, about one-third of
from the Kingsbridge station of the
ork Central Railroad, and just off
in road to Yonkers. The hill is
be one-half mile long and has a
ıacadam surface. The grade varies
5 and 12 per cent., being about
ent. at the start, 12 per cent. in the
and 5 per cent. near the top.
competitors will be given one trial
rolling start, and gold, silver and
medals will be awarded for the fast-
pective times. Entries will close
with Roland Douglas, 107 West
second street, New York.

ESSEX COUNTY A. C.

meeting of automobilists at New-
J., to discuss the organization of a
b to be known as the Essex County
bile Club, R. M. Jenkinson acted
rman and W. J. Morgan as secre-
After a vote of thanks had been
to W. E. Scarritt, president of the
rsey Automobile Club, Mr. Scarritt
on the advisability of keeping to-
nd not dividing the strength by or-
g separate bodies. He suggested
committee of five be appointed to
many of those present desired to
New Jersey club. After some dis-
it was voted to go ahead with the
ganization, and a committee of four
ointed to outline plans for the new
d to see what could be done about
a State organization, as follows:
Hoag, Dr. J. R. English, Edgar
, Dr. H. C. Harris and Daniel Pier-
Richard M. Jenkinson was asked
me president, but declined, and no
officers were elected. The next meeting
was left to the call of the committee.

A. C. A. Affairs.

A. C. A. SETTLES ITS DIFFERENCES.

The Automobile Club of America held the largest meeting of its history last Saturday evening to learn the sentiment of the members on the Doughty-Bailey bill now in the hands of Governor Odell. There was some thought of making the session a sensational one, but this was prevented by the cooler headed members. The officers of the club who endorsed the bill during its passage carried their plans out, and the faction that was opposed and sought to have the previous position of the club receded from were, to all appearances, satisfied. A resolution was carried, placing the members on record in a vote of confidence in the officials, and it was decided that no committee should go to Albany to protest. It was felt that there would be enough other organizations present and that the sentiment of the club is now well enough known.

The discussions were lengthy, but no ill feeling was expressed, and after the meeting was over both sides entered into a love feast in the Dutch room with every evidence of good will and as though no differences had ever existed.

Percy Owen, who led the forces opposed to President Shattuck and the law committee, said after the meeting:

"Apparently both sides have been satisfied, and there is no reason to doubt it. We have succeeded in placing the club on record as opposed to the bill, and we have also voted our confidence in the club officials. Undoubtedly they did what they thought was best. There will not be a committee in Albany to protest, because that would be going further than anyone would care to go now, everything considered. But the best result of all is the fact that we now know that hereafter the members at large will have a little more to say in matters that interest the club and the industry."

The clubrooms will be kept open hereafter until 12 o'clock p. m. instead of 11 o'clock.

Association of Licensed Automobile Manufacturers.

Twenty-four licenses have been granted by the Association of Licensed Automobile Manufacturers to date, and General Manager George H. Day says that at present there are about three more manufacturers who will be given licenses. These include the leading firms in the trade.

Those who have received licenses are as follows: The Winton Motor Carriage Company, Electric Vehicle Company, Olds Motor Works, the Autocar Company, the George N. Pierce Company, Packard Motor Car Company, Apperson Brothers Automobile Company, Searchmont Automobile Company, Knox Automobile Company, Locomobile Company of America, the Haynes-Apperson Company, the Peerless Motor Car Company, United States Long Distance Automobile Company, Waltham Manufacturing Company, International Motor Car Company, the J. Stevens Arms and Tool Company, H. H. Franklin Manufacturing Company, Charron, Girardot & Voigt Company, the Commercial Motor Company, Berg Automobile Company, Cadillac Automobile Company, Northern Manufacturing Company, Pope-Robinson Company, Kirk Manufacturing Company.

MINOR MENTION

Morris N. Mason has been appointed the New York agent for the Michelin tires and tire novelties.

The Standard Anti-Friction Company, New York, have removed to 144 West Thirty-ninth street.

The Baker Motor Vehicle Company, of Cleveland, Ohio, have secured a site of 5½ acres, near Edgewater Park, for their new factory, which it is said will cost about $250,000.

F. A. Babcock and H. J. Linn have formed a partnership under the style of Babcock & Linn, and will handle the New York business of the Buffalo Electric Carriage Company.

H. W. Hammond has ordered to be built a 10 horse power gasoline automobile especially adapted for desert travel between Goffs, Cal., and the Bonanza King mine, 25 miles distant.

The Winton Motor Carriage Company, of Cleveland, Ohio, has just sold a special touring car to an Ohio medicine company for advertising purposes. It is fitted with a pair of Dietz new Lucifer gas lamps of great power.

It is reported that the Robbins & Myers Company, of Springfield, Ohio, will manufacture the automobile recently patented by their electrician, Ralph Thompson, and Emil Koeb. It is expected that the first machine will be on the market in about sixty days.

The United States exports of automobiles and parts during the month of March were valued at $93,618, compared with $88,350 for the same month last year. The exports for the first quarter of 1903 amounted to $759,841, compared with $517,532 for the first quarter of 1902.

A meeting of citizens interested in opening an automobile line between Knoxville, Smithwood, Beverly and Fountain City, Tenn., held at Knoxville on April 23, was largely attended. S. B. Waggoner was elected president and Robert E. Lovelace secretary. A committee composed of M. S. McClellan, T. T. McMillan and S. B. Waggoner was apointed to ascertain the cost of the equipage, and another committee composed of E. F. Mynatt, Rufus

Miller and A. McDonald to select a route and investigate all legal questions involved.

The *Pacific Automobile*, a new monthly automobile publication, has been started at Los Angeles, Cal. G. W. Harrington is the editor and C. H. Morris business manager.

A reader inquires where he may obtain spring washers like the Thackery washer referred to in a recent article by Mr. Bickford. We shall be pleased to forward any replies.

The effort to form a national association of motor cyclists, the initiative of which was recently taken by the New York Motor Cycle Club, is reported to be meeting with encouragement.

We are informed that President Julio A. Roca, of the Argentine Republic, has just placed an order for two Oldsmobiles with Messrs. Ramon Camano & Co., the Oldsmobile agents at Buenos Ayres.

J. H. Jones, manager, and F. H. Bogert, draughtsman, of the Bristol Motor Car Company, of Bristol, R. I., will this week start on a 1,000 mile trip in one of the company's model cars to South Bend, Ind., for the purpose of testing it and their patented air cooled motor.

William L. Dickinson, of Springfield, Mass., treasurer of the New York-Chicago Road Association, reports that the proposed boulevard from New York to Chicago in particular is meeting with great encouragement and support and that John Jacob Astor has offered the association $10,000 if it will change the location of the New York end from the west to the east side of the Hudson River, crossing at Rhinecliff.

We have received a copy of the fourth edition of "The Gas Engine Handbook," by E. W. Roberts, M. E., published by the Gas Engine Publishing Company, of Cincinnati, Ohio. The new matter in this edition consists of an addendum of matter on automobile engine design, a further discussion of the power factor and of two cycle engines. The notes on screw propellers have been revised to bring them into accord with present practice.

Near Amesbury, Mass., some damage was recently done owing to a horse driver improperly handling his horse when meeting an auto. He drove behind a two horse team and when that had got by the auto he started, at the same time saying: "This old plug is not afraid." When just opposite the auto the horse sidestepped just a little and the driver hit him with a whip. The sudden start the horse made at being hit caused the whiffletree to give way and the same time the shaft to break and the broken end to pinch the horse, who started off on a dead run. The two horse team was then about 100 feet ahead, and there not being room on the narrow road for the single team to get by, they collided, which caused the driver to be thrown out and the horse to free himself and run by the pair, which also started to run. The parties in the automobile took the injured driver to his home.

LEGISLATIVE AND LEGAL.

The Doughty-Bailey Bill.

The New York Automobile Trade Association held a meeting last Friday evening at 1711 Broadway, New York, and elected four new members. A resolution was adopted asking Governor Odell to veto the Doughty-Bailey bill. In addition to this it was decided to send a committee to Albany today to protest further. The Congressional Committee on the improvement of New York harbor received some attention, and it was decided to take the members, about sixty in number, around the city in automobiles upon their arrival here today. The meeting was a long one and given over almost entirely to the discussion of the bill in Governor Odell's hands.

Governor Pennypacker, of Pennsylvania, on April 26 signed the Grim automobile bill.

In Manchester-by-the-Sea, N. H., the police have measured off a mile stretch on a highway for the purpose of timing automobilists.

Three automobilists, T. J. Clark, R. Ortman and W. G. Clark, of Chicago, Ill., were fined $10 each on April 28 for excessive speeding.

Owners of automobiles in Philadelphia have been notified to return their pasteboard license cards and obtain new steel and enamel signs, under penalty of arrest for failure to comply.

Fred Small, of Hamilton, Ont., has brought suit for $60 against Harry G. Greening for damages alleged to have been caused by defendant's automobile to plaintiff's horse and wagon in a recent runaway.

Paul Picard, of Chicago, who was recently put under the ban for three days on account of fast driving in his automobile, has apologized to the officials, and City Electrician Ellicott has issued another license to him.

The suits of Edward M. Dasher and Arthur Lewis against the Long Island Railroad Company for $10,000 for damages resulting from an automobile accident at Westbury, L. I., on October 30, 1901, were dismissed in Brooklyn, New York, on April 27.

The Denver (Col.) automobile ordinance has been of much assistance to the assessors of taxes, who have been enabled by means of the license requirement to identify and tax the owners. Previous to its adoption it is estimated that one-third of the automobiles in the city went untaxed.

Police Commissioner Greene, of New York city, has under consideration the adoption of automobiles to be used in pursuing those who violate the speed ordinance. Plans and specifications for an automobile, to be built for speed, are said to have been recommended by the Deputy Commissioner of Police of Brooklyn.

A resolution has been offered in the Milwaukee common council, condemning the recklessness of automobile operators and instructing the police to diligently enforce the provisions of the ordinance passed on September 23, 1902.

An ordinance requiring that automobiles be numbered, but permitting the number to be as small as the owner may desire, was adopted by the West Park Board of Chicago, Ill., on April 28. The number must be the same as the license number, and the speed not faster than 8 miles an hour.

Arthur P. Sturgis, New York, was last week discharged from arrest upon the charge of having exceeded the legal speed for automobiles, the magistrate holding that the policeman who made the arrest could not have known how fast Mr. Sturgis was going, as he did not have a watch.

F. A. Betts has been directed by the Superior Court to file duplicates of his accounts as receiver of the Keating Wheel and Automobile Company, of Middletown, Conn. Mr. Betts was appointed receiver about three years ago, but counsel for the creditors claimed that he had not filed the accounts. Mr. Betts states positively that they had been filed, but they are now apparently missing.

Kenneth A. Skinner, of Boston, Mass., on April 28 was discharged from arrest upon the charge of having illegally speeded his automobile on Commonwealth avenue, the presiding judge holding that "the evidence on the testimony of the officers is not sufficient to hold the defendant, in spite of the fact that the machines were timed by stop watches." Arthur Silsby, charged with the same offense, was also discharged, but Philip Buchanan pleaded guilty to a charge of excessive speeding and was fined $25.

At a meeting of the committee on public safety of the Indianapolis (Ind.) Council a large number of citizens and automobilists appeared and argued in favor of an ordinance regulating the speed of automobiles being passed. The proposed ordinance was amended so as to make the speed limit 8 miles an hour in the downtown districts and 12 miles an hour in the outlying districts. Every owner must file his name and a description of his machine with the city comptroller and must also place his initials on the rear of his machine.

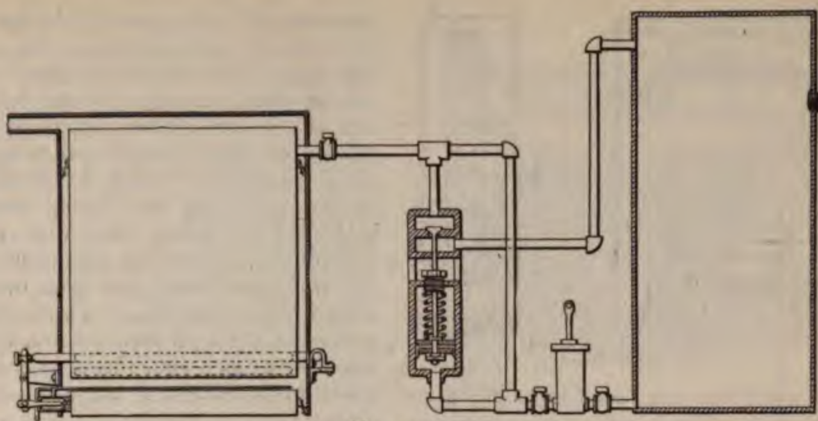
More than 1,050 persons in Chicago are said to hold automobile licenses and the number is constantly increasing. On May 1 City Electrician Ellicott transmitted to the chief of police a cut of the new badge, with orders for the arrest of everyone operating an automobile without a 1903 license and badge. The base of the new badge is a gold wreath in relief, on which is a royal blue enamel plate with the words: "Chicago Automobile License." On this is a gold bar with the number in black, held by a pair of wings surmounting a shield in scroll.

MOTOR VEHICLE PATENTS..

United States Patents.

725,945 Steam Engine.—E. C. Doolittle, of Wallingford, Conn. April 21, 1903. Filed April 11, 1902.

The engine of this invention is claimed to be particularly suitable for automobile use. The engine comprises two parallel cylinders which are closed at opposite ends by caps, and on one side of the cylinder is a steam chest having passages extending into the top and bottom of the cylinder respectively, the steam chest and cylinder being formed integrally with each other. The steam chests are formed with a flange, by which they may be coupled together. In the cylinder is a piston having a cylindrical central portion and heads, and in the side of the cylinder opposite the steam chest is a slot, the length of which is slightly greater than the throw of the piston. On opposite sides of this slot are guideways for a slide, the length of the slide being such that when the piston is at its extreme positions the slide will close the slot. Extending through the slide and into the central portion of the piston is a pin, to which a pitman is connected, the pitman extending downward into engagement with a crank on a crank shaft. Within the steam chest is the usual cut-off, adapted to alternately open and close the steam ports, and operated by a stem which extends downward into engagement with an eccentric on the crank shaft, so that the rotation of that shaft will operate the cut-off. This crank shaft extends through a gear box connected with flanges projecting from the bottom of the cylinders.



No. 725,772.

725,772. Steam Boiler.—C. M. Raymond and L. E. Hoffman, of Cleveland, Ohio. April 21, 1903. Filed December 1, 1902.

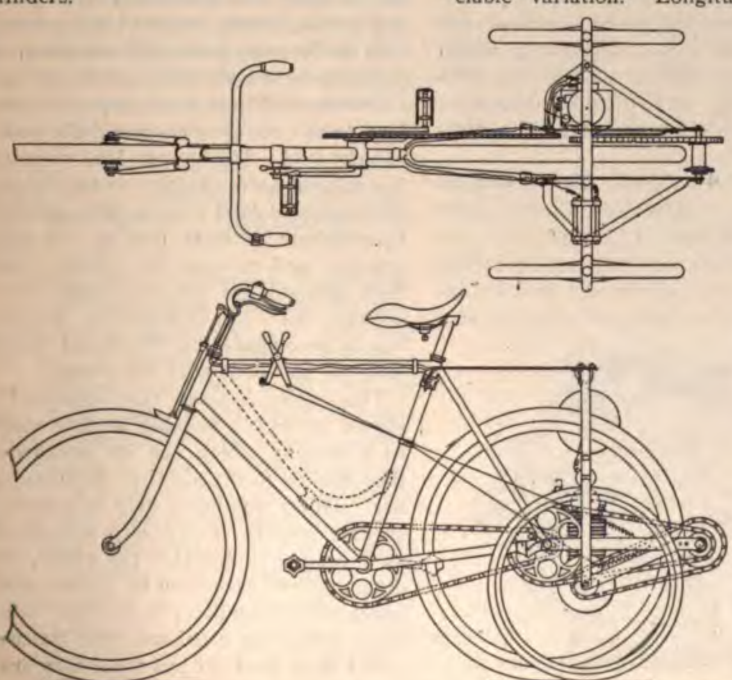
This invention relates to automatic regulators for steam boilers in which the steam is generated by the combustion of a hydrocarbon gas; and it is the object of the invention to form an improved device whereby the supply of water will be regulated by the pressure in the boiler and the supply of gas by the temperature of the boiler coils.

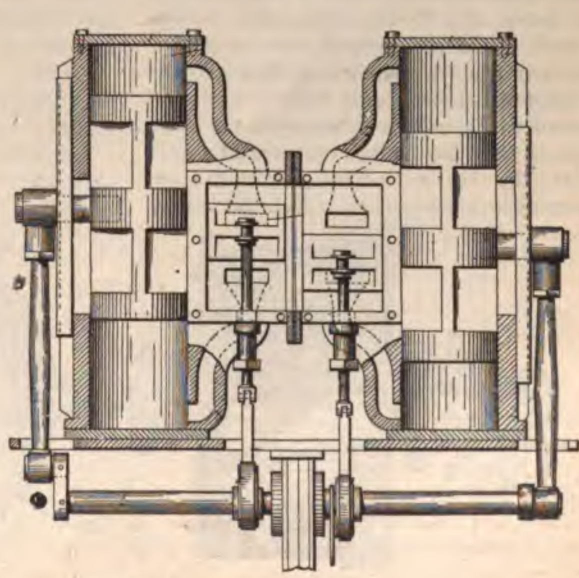
A vaporizing pipe for the fuel extends across the burner and discharges into the mixing tube nozzle through a valve controlled by a thermostatic regulator. This regulator comprises a double armed lever, one arm of which is connected to the valve needle and the other arm of which cooperates with the lowest of the boiler tubes through an adjustable thumbscrew. The end of the tube on which the thumbscrew bears is free to move in a longitudinal direction while the opposite end of the tube is fixed to the supporting frame of the boiler, which is not exposed to the heat of the boiler, and therefore free from appreciable variation. Longitudinal expansion of the tube produces a corresponding closure of the fuel valve, and thereby varies the fire. Contraction of the pipe produces the opposite effect.

The action of the automatic feed regulator will be readily understood. There are two forces acting on the bypass valve, the boiler pressure and the spring pressure. The spring pressure tends to help the bypass close. The boiler pressure acts on the valve at both ends, but as the surface exposed to its action is greater at the lower end it tends to open the valve. Hence when the boiler pressure on the check valve rises beyond a point determined by the strength of the spring the piston is forced up, opening the bypass valve, so that no water is fed to the boiler; but it returns to the tank through the bypass. When the steam pressure is less than that of the spring, the check valve opens under the pump pressure and water is fed to the boiler.

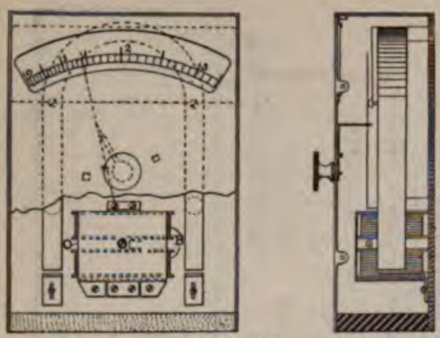
725,765. Volt-Ampere Meter.—Louis M. Pignolet, of Orange, N. J. April 21, 1903. Filed September 27, 1901.

This invention provides certain improvements in electrical instruments of the galvanometer type. To make the instrument "dead beat" a manual device is employed to stop the needle from swinging, except through a very small arc, at about the de-





No. 725,945.



No. 725,765.

gree which one can judge to be the stopping point. The invention also involves means for obtaining greater accuracy in the reading by preventing influences from acting thereon from outside sources, such as iron and magnets. The instrument is constructed not only with an iron shield under the same and contiguous to the outside of the solenoid, but in addition an iron sheet is provided extending from the iron base plate, so as to cover one end of the solenoid and also the top, where the iron sheet is on the opposite side of the solenoid, measured from the base plate.

The invention also includes means for increasing the certainty of reading the higher voltages with greater accuracy. The needle is provided with an armature of such construction that the electromagnet of the meter causes greater and greater throws of the needle the more the poles of the armature depart from the poles of the permanent magnet.

725,812. Variable Speed Gearing.—Walter S. Austin, of Grand Rapids, Mich. April 21, 1902. Filed June 23, 1902.

This speed gearing is of the planetary type and gives two forward speeds and a reverse. No internal gears are used, and all gears are fully enclosed. At the right in the sectional view is shown a portion of the flywheel of the engine, and the gear is mounted on an extension of the engine shaft of reduced diameter. Motion is transmitted from the flywheel to a driving disk mounted loosely upon the engine shaft, by means of a flexible connection consisting of coiled springs and bolts projecting laterally from the flywheel spokes. To the hub of the driving disk is fixed a driving pinion which meshes with one of the three sets of planetary pinions mounted in a gear case. To the right of the gear case is arranged a brake drum, which is loosely mounted upon a sleeve on the driving shaft. Gear pinions are fastened to the hub of this brake drum and to the sleeve on the driving shaft, meshing with the two other sets of planetary pinions respectively. The driving sprocket is capable of being positively connected to either the brake drum or the sleeve on the driving shaft, by means of a sliding part with positive clutch jaws. Upon the gear drum there are two brake bands and upon the brake drum a third brake band. The brake band located on the right hand side on the gear drum serves as a clutch band to clutch the drum to the flywheel. When this band is applied to the drum the entire gear is locked and the transmission is direct. To obtain the slow forward speed the central one of the three brake bands is applied to the drum or gear case and the sprocket pinion is connected to the sleeve on the driving shaft. To obtain the reverse motion the sprocket pinion remains connected to the sleeve and the brake band on the left is applied to its brake wheel. By wholly releasing the gear case connecting the sprocket pinion with the brake wheel and applying the brake band to the latter, the motion of the vehicle can be checked.

725,675. Driving Mechanism for Self Propelling Vehicles.—Patrick J. Collins, of Scranton, Pa. April 21, 1903. Filed August 29, 1902.

A constantly operated engine and dynamo, carried by the vehicle, are employed to supply power to one or more electric motors, the armatures of which are geared to the driving wheels of the vehicle. To reduce the weight of the combination the inventor provides an electric machine which combines the function of a generator and motor, comprising two or more armatures in a single field frame. The generator armature, which occupies the centre of the casing and supplies current for both motor armatures, is directly connected to a constant speed explosive engine, while the motor armatures, which are arranged on either side of the generator armature and parallel therewith, are independently connected to the driving wheels.

725,924. Bicycle Motor Tender.—Warren J. Belcher, of Hartford, Conn. April 21, 1903. Filed April 17, 1903.

An independent wheeled motor carrier or tender is provided having its own independent running gear, upon which tender may be supported a gasoline motor, the supply tanks therefor, the battery and spark coils being also located upon the frame of the carriage. The tender is conveniently attached to the bicycle by means of resilient braces or stays, whereby the carriage will support the weight of the motor and its accoutrements and will receive all shock and vibration from the operation of the motor, and by means of the resiliency of the attaching stays the shock will not be communicated to the bicycle or its rider. By this means it is possible to take an existing safety bicycle and apply the motor attachment thereto. The carriage taking up as it does all vibration and shock and sustaining the weight of the propelling mechanism, the bicycle proper will not be racked by the thrust and pounding and incident vibration of the motor, and the frame and wheels of the bicycle will also be relieved from bearing the additional weight of the propelling mechanism, as is the case with existing forms of motor bicycles.

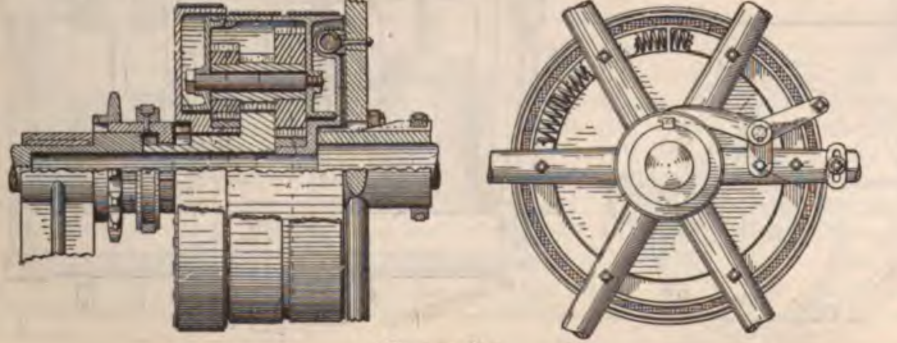
724,619. Electric Accumulator.—Albert Schmidt-Predari, of Weimar, Germany. April 7, 1903. Filed July 24, 1902.

The active mass for the negative pole electrodes is composed of a mixture of lead oxide, red lead, calcium hydroxide and alkali thiosulphate. These additions are made for the purpose of preventing the active mass from being hardened when brought into the forming bath. The following proportions, by weight, give good results: Two parts of lead oxide, one part of red lead, one-twentieth part of calcium hydroxide and one-twentieth part of sodium thiosulphate.

The active mass for the positive pole electrodes is composed of a mixture of lead oxide, red lead and porous spongy lead. The addition of spongy lead is made for the purpose of giving the mass a certain tenacity and cohesion and of preventing it from being hardened when brought into the forming bath. The following proportions by weight give good results:

One part of lead oxide, two parts of red lead and about one-twentieth part of spongy lead. The spongy lead referred to is prepared galvanically by immersing several plates of lead in a solution of sodium thiosulphate of from 1.07 to 1.12 specific gravity, and passing an electric current. This method has the advantage that the spongy lead is not deposited on the plates, but is precipitated in the liquid and collects on the bottom of the vessel.

The active masses thus obtained are stirred up with a suitable binding material to a magma which can be kneaded and then applied to the plates in the usual manner. Dilute sulphuric acid of about 1.12 specific gravity is specially advantageous as a binding material. The plates, which differ in form according to the purpose for which the accumulator is destined, are cast from lead in the usual manner. Before the active mass is applied to them they are immersed in a solution of salt—for instance,



No. 725,812.

ibout 1.04 specific gravity—to purify i from fatty matter. The plates made iis manner are formed in a solution of iber salt of 1.09 specific gravity, which ated before use, care being taken that evaporation of water occurs, and is ed into the vessel while warm. The erature of the liquid when poured into vessels is preferably of from 25° to 30° nd decreases to the surrounding temture during the formation, which re-:s from two to three hours. The ed plates are used with an electrolyte ilphuric acid, to which an alkali thio-iate has been added. Sulphuric acid 14 specific gravity with an addition of im thiosulphate solution of 1.04 spegravity has been found to be suitable, roportions being two volumes of sulic acid and from one-half to one vol-of sodium thiosulphate solution. This d, which is at first turbid, becomes when the accumulator is first charged, then remains clear.

4,836. Steering Gear for Vehicles.—ph Field and James Field, of Newton ny, England. April 7, 1903. Filed l 28, 1902.

1,856. Secondary Battery Electrode.—f Hahmann, of Berlin, Germany. l 7, 1903. Filed July 19, 1902.

pasted plate, an oblong square frame, olded or cast with a reticulated bottom ce or back on one side, leaving the side of the frame open. This reticd bottom surface is comparatively and is strengthened and stiffened by mediate bars, dividing the thin botinto compartments. Into the basin re formed by this frame and the reticd bottom the active material is ed and retained therein by a reticu-cover plate, the border of which hes or registers with the border of the frame, and is fastened to the latter by ring. This cover plate is as thin as eticulated bottom facing of the base e, and its reticulations are formed by ds crossing at right angles within the er of the cover frame.

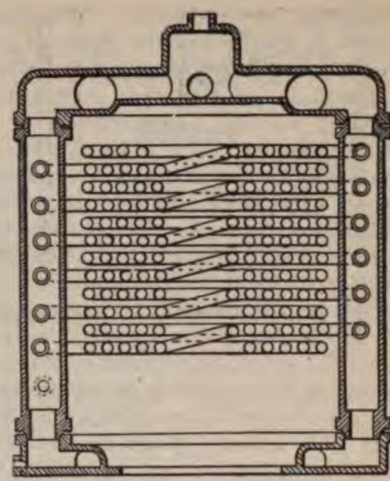
,644. Electric Igniter for Explosive nes.—G. A. Goodson, of Providence, April 14, 1903. Filed December 26,

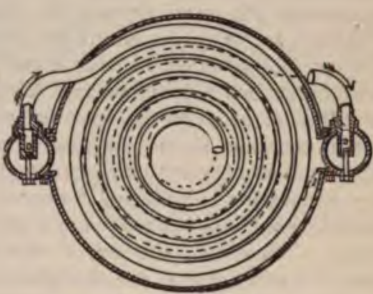
cording to this invention, which also s to the Goodson magneto, the tripdevice is placed upon a secondary and is combined with a sprocket l, which is driven by a chain from the e crank shaft or cam shaft. Experihas shown that the vibration or poundncidental to intermittently acting mag-as hitherto constructed has usually of such a serious character as to pretheir commercial success. Unless rly cushioned by buffing devices the tion would so shake the coils of the ture winding as to destroy the insula-between the wires and to short circuit urrent. The noise incidental to the ct between the driving and the driven parts when such vibration was permitted was also very objectionable.

This invention is claimed to overcome all these difficulties without cushioning or buffing devices. This result is secured by arranging the driving mechanism in such manner that when the armature is in the normal or spring held position the tripping crank and connecting rod are in a dead centre position with relation to each other. Hence, when the tripping pin on the sprocket strikes the tripping crank there is practically no shock to the armature. The primary impelling device or engine driven wheel forces the spring impelled parts away from their dead centre or idle position and then releases the same, permitting the spring impelled parts to settle back to their dead centre, with the armature locked against vibration, as the normal position of these parts.

725,737. Steam Generator.—Charles A. Marrder, of New York, N. Y. April 21, 1903. Filed January 16, 1902.

The invention relates to a form of water tube boiler comprising two vertical water legs and a series of superposed horizontally arranged coils, the opposite ends of which are connected to the two water legs or standpipes respectively. The coils are inclosed in a casing and the standpipes are located just outside this casing. Hence the connections are all outside the combustion chamber. The connections are of a special conical type comprising a bolt passing diametrically through the standpipe.





No. 725,737.

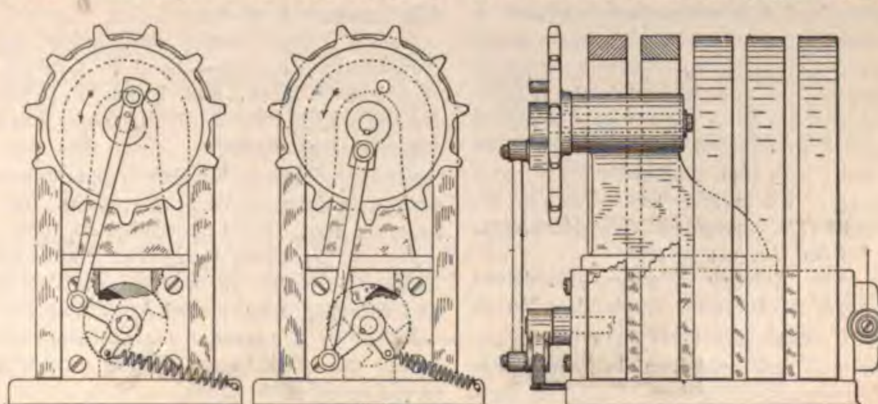
724,387. Method of Producing Storage Battery Plates.—William Gardiner, of Chicago, Ill. March 31, 1903. Filed December 13, 1900.

The complete process for electro-chemically forming the elements of electric accumulators comprises three steps.

The first step consists in subjecting the plates as positive electrodes to the action of a certain electrolyte for the purpose of oxidizing the metallic lead.

The second step consists in subsequently subjecting the oxidized plates as negative electrodes to the action of another electrolyte, and thereby reducing the oxide to spongy lead.

The third and last step consist in again subjecting the plates as positive electrodes to a third electrolytic bath. The object of this latter treatment is to harden and toughen the active material and increase the cohesion between its particles and between it and the supporting main part or body of the plate. To each gallon of a 10 per cent. solution of sulphuric acid are added 5 ounces of sulphate of aluminum, 5 ounces of nitrate of ammonia, and 1 ounce of oxalic acid. A small amount of tartaric acid may also be added. The plates designed to subsequently become the positive and negative elements of the battery cells are submerged in this bath. Then the positive wire from a source of electric current is connected to the plates, so that the current will pass through. The density of the current should be adjusted so that about two or three amperes per square foot of plate surface shall pass through the bath. The current should be continued until the lead plates have been sufficiently oxidized. The plates should be about the color of an equal mixture of salt and pepper when the



No. 725,644.

first step has been completed. To convert the oxide to spongy lead the plates are removed from the electrolyte just described and placed in an electrolyte termed the "reversing" solution. This consists of a solution of sulphuric acid, to each gallon of which is added 3 ounces of tartaric acid and 5 ounces of sulphate of magnesia. After the plates have been placed in this electrolyte the current is directed from the dummy electrodes through the liquid to the oxidized plates and converts or reduces the oxide in the plates to spongy metallic lead. The current should be adjusted so that approximately fifteen amperes per square foot of plate surface will flow through the electrolyte. The current should be continued until the oxide has been entirely reduced to spongy lead. For the purpose of causing this mass of spongy lead to adhere more tenaciously to the metal support the plates thus formed are put in an electrolyte which with the co-operation of the electric current will bond the two substances and effect a close adhesion between the lead structure and the cohering mass of spongy lead. This "bonding" solution may consist of 15 ounces of sulphite of soda and 8 ounces of sulphide of ammonium dissolved in a gallon of water. While the plates are in this solution, a current equal to the charging current of the completed cells is sent through them for twelve or fifteen hours. After this third and last step has been completed the plates are removed, washed and finally charged in a sulphuric acid solution having a specific gravity of about 1.2, when they are ready for commercial service.

724,253. Liquid Fuel Burner.—Joseph G. Branch, of St. Louis, Mo., March 31, 1903. Filed April 1, 1902.

723,327. Storage Battery.—Elmer A. Sperry, of Cleveland, Ohio. March 24, 1903. Filed August 12, 1901.

Provides an improved binding agent for the active material of storage batteries. This binding material or menstruum consists of a neutral liquid, preferably distilled water, to which is added ammonium hydroxide. The precise proportions of the mixture are not important; but it is found that one part of the hydroxide to two parts or three parts of water gives satisfactory results.

The dry powdered substance which forms the body of the element, a composition of metallic lead and ammonium sulphate, is thoroughly mixed with the menstruum above described, as by violently agitating the dry powder and the liquid in a suitable vessel, and the plastic mass thus prepared is applied to the grid, which is then dried out under very high pressure.

723,945. Pneumatic Tire.—Pardon W. Tillinghast, Cranston, R. I. March 31, 1903. Filed August 9, 1898.

722,567. Exhaust Silencer.—Middleton Crawford, of London, England. March 10, 1903. Filed December 3, 1901.

The muffler is cylindrical in form and is divided longitudinally into two halves by a partition wall. The half into which the exhaust products from the cylinder are led is called the expansion chamber. The chamber is provided with inner and outer walls of sheet metal, the space between the walls being filled with asbestos, so as to minimize or deaden the noise.

The other half of the muffler is divided into several concentric chambers. The expansion chamber communicates with the inner one of these chambers through a non-return valve. When the exhaust gases enter the expansion chamber their pressure opens the non-return valve and they pass on into the successive concentric chambers and out of the muffler. When the pressure in the expansion chamber is relieved the non-return valve is closed by a spring and a vacuum is formed in the expansion chamber owing to the cooling effect of the walls.

721,146. Outer Cover for Pneumatic Tires.—Joseph Butler, Altrincham, England. February 24, 1903. Filed October 21, 1902. Serial No. 128,098. (No model.)

721,876. Automobile.—Frederick L. Fay, Holyoke, Mass. March 3, 1903. Filed January 20, 1902.

722,946. Frame for Battery Electrodes.—Herbert Cottrell, Newark, N. J. March 17, 1903. Filed September 13, 1902.

723,090. Steering Mechanism for Motor Vehicles.—Robert Watson, Washington, D. C. March 17, 1903. Filed August 22, 1902.

723,168. Propelling Means for Automobiles.—Hermann Lemp, Lynn, Mass. March 17, 1903. Filed November 2, 1900.

725,668. Governing Mechanism for Gas Engines.—Leopold F. Burger, Anderson, Ind. April 21, 1903. Filed November 11, 1901.

725,713. Motor Vehicle.—Charles W. Hunt, West New Brighton, N. Y. April 21, 1903. Filed June 16, 1902.

725,978. Power Translating Device.—George W. Marble, Buchanan, Mich. April 21, 1903. Filed September 18, 1902.

725,990. Internal Combustion Engine.—Andrew L. Riker, Shorthills, N. J. April 21, 1903. Filed July 16, 1902.

726,191. Vaporizing Valve for Explosive Engines.—William Readle, Elmira, N. Y. April 21, 1903. Filed January 17, 1901.

726,226. Explosive Engine.—August Krastin, Cleveland, Ohio April 21, 1903. Filed August 5, 1901.

725,955. Foot Starter Mechanism for Automobile Engines.—David F. Graham, Springfield, Mass., and Frank A. Fox, New York, N. Y. April 21, 1903. Filed September 21, 1901.

721,159. Boiler Feeding Apparatus.—Chas. Crompton, of Worcester, Mass. February 24, 1903. Filed September 20, 1901.

722,005. Sparking Igniter for Explosive Engines.—Charles E. Duryea, of Peoria, Ill. March 3, 1903. Filed April 3, 1900.

Refers to a governor for automatically timing the spark in the engine according to the speed of the latter.

725,741. Fuel Feed Regulator for Explosive Engines.—Charles A. Miller, of Reading, Pa. April 21, 1903. Filed March 1, 1902.

724,607. Battery Box or other Receptacle.—Leonard Paget, of New York, N. Y. April 7, 1903. Filed August 28, 1901.

725,087. Oscillating Piston Explosive Engine.—James A. Jenney, Fairhaven, Mass. April 14, 1903. Filed September 18, 1902.

725,155. Apparatus for Manufacturing and Vulcanizing Rubber Tires.—Frank A. Seiberling, Akron, Ohio. April 14, 1903. Filed July 18, 1902.

725,218. Storage Battery.—Rufus N. Chamberlain, Depew, N. Y. April 14, 1903. Filed August 13, 1902.

725,243. Pneumatic Clutch.—Charles B. Goodspeed, Columbus, Ohio. April 14, 1903. Filed October 3, 1902.

725,250. Brake for Automobiles.—Ludwik L. Hoffman, New York, N. Y. April 14, 1903. Filed January 3, 1903.

725,394. Self Propelling Vehicle.—Augustus A. Ball, Jr., Lynn, Mass. April 14, 1903. Filed June 5, 1902.

725,456. Electro-Magnetically Operated Steering Check.—Hermann Lemp, Lynn, Mass. April 14, 1903. Filed June 5, 1902.

725,457. Steering Check for Vehicles.—Hermann Lemp, Lynn, Mass. April 14, 1903. Filed June 16, 1902.

725,477. Motion Checking Device.—Otto F. Persson, Lynn, Mass. April 14, 1903. Filed September 29, 1902.

725,482. Speed Changing and Clutch Mechanism for Motor Vehicles.—Louis Renault, Paris, France. April 14, 1903. Filed November 29, 1901.

725,629. Transmission Gear for Motor Vehicles.—Andrew L. Riker, Shorthills, N. J. April 14, 1903. Filed July 16, 1902.

726,353. Rotary Explosive Engine.—Paul C. Sainsevain, San José, Cal. April 28, 1903. Filed June 12, 1902.

726,671. Odometer.—John N. Leach, Melrose, Mass. April 28, 1903. Filed March 25, 1902.

726,671. Vaporizer for Explosive Engines.—George A. Gemmer, Marion, Ind. April 28, 1903. Filed December 30, 1901.

722,723. Steering Gear for Motor Vehicles.—Frederick Lamplough, Willesden, London, England. March 17, 1903. Filed April 16, 1902.

722,744. Driving Mechanism.—Charles R. Otis and Andrew M. Coyle, Yonkers, N. Y. March 17, 1903. Filed October 7, 1901.

722,749. Pump.—Lucius J. Phelps, Melrose, Mass. March 17, 1903. Filed October 1, 1901.

722,774. Explosive Engine.—Frederick W. Toedt, Hamburg, Ia. March 17, 1903. Filed February 28, 1902.

722,804. Composite Tire for Wheels.—Edward I. Braddock, Winchester, Mass. March 17, 1903. Filed June 14, 1902.

722,916. Motor Vehicle.—Gordon J. Scott, Philadelphia [illegible] March 17, 1903. Filed May 16, 1[illegible]

THE HORSELESS AGE

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Devoted to Motor Interests

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Reduction of Subscription Price.

We believe the time has come when a technical publication like The Horseless Age will find a wider field of usefulness at a more popular price, and we have accordingly reduced the domestic subscription price from $3.00 to $2.00 a year. Dating from January 1, 1903, subscribers at the old rate will receive a rebate in the form of an extension of their subscriptions—six months for yearly subscribers and three months for six months subscribers.

Notice to Advertisers.

Hereafter the first advertising form will be closed on Saturday and the second advertising form on Monday preceding the date of publication. Copy for new advertisements or changes of copy must be in our hands on or before Saturday in order to secure insertion in the succeeding number.

Gasoline Not an Explosive.

The reference to a "miniature volcano in the form of a 10 gallon can of gasoline," by a writer in our last issue, gives expression to an idea about gasoline which, though erroneous, is very common among laymen. Gasoline is thought to partake of the nature of an explosive, like gunpowder or dynamite. It is true that a certain weight of gasoline contains more energy than an equal weight of either gunpowder or dynamite, but there is no available means of releasing this energy in a very brief period of time, and herein lies the difference between gasoline and the explosives. Every automobilist knows that the available amount of energy of a 10 gallon tank of gasoline is enough to drive a ton vehicle 100 miles or more over the road, and would be sufficient to raise the vehicle many miles vertically into the air. But the gasoline can only be deprived of its energy gradually by a closely defined process. Before ignition it must be vaporized and mixed with air in certain proportions, and if the proportion of air to gasoline vapor in the mixture is not within certain definite limits it is impossible to ignite the mixture. If an engine cylinder be filled with gunpowder and an electric spark be produced within the cylinder the whole machine would be torn to pieces, whereas if the cylinder were filled with gasoline and a spark produced nothing would happen. The reason is that the explosive contains in itself both the elements necessary for combustion, the hydrocarbon and the oxygen, while the gasoline is dependent upon the oxygen of the atmosphere, and is therefore harmless where it is not in contact with the latter.

The danger of gasoline resides in its great volatility. When exposed to the atmosphere it readily evaporates, and may, of course, form an explosive mixture. Gasoline fires are practically always due to leaks in the gasoline containing and conveying system. As long as the fluid remains within the tank it is harmless, and even the vapor in the upper part of a partially filled tank is unignitible, containing too little air, or forming too rich a mixture, to use the common technical expression.

We often read in the newspapers of automobile explosions, but with the exception of a few explosions of air pressure tanks on steam carriages there is no authentic record of any explosions of a serious nature on automobiles. Certainly no tank of gasoline can explode, and what is usually meant when an automobile explosion is mentioned in the papers is a fire. A leak in the gasoline system causing the gasoline to expand over the parts of the machine and on the ground may under conditions lead to a very fierce blaze, which is, however, something entirely different from an explosion.

The Coming Commercial Vehicle Trials.

Preparations for the Commercial Vehicle Trials are reported progressing very satisfactorily, and the number of entries is already large enough to insure the success

of the event. Being the first of the kind in this country it is bound to arouse more than the usual amount of public interest, a fact which ought to be considered by possible entrants. The organizers of the contest have been somewhat disappointed by the failure of New York business houses employing automobile deliveries and trucks to enter vehicles, but it is expected that some of these will enter shortly before the lists are closed.

Although there are probably more electric delivery wagons and trucks in use at present than of other motive powers, judging from local conditions, the entries, with one exception, so far are limited to steam and gasoline vehicles. That the electric interests would withhold from the contest was expected, as it was commonly understood that it was owing to their influence that the N. A. A. M. disapproved of holding the contest this spring.

Some of the manufacturers entered expect the contest to create a large demand for business wagons, and in view of the results of the several Liverpool trials these expectations seem well founded. Motor drays are now in use by many shippers, millers and brewers in and around Liverpool, and a company has been formed in that city to carry on road haulage between the inland manufacturing towns and the port by means of motor wagons. Although this company has been in operation for less than a year we are informed that it has already accomplished haulage work equal to 30,000 ton miles.

The Value of a Practical Journal to Automobile Factory Employees.

Machinists and other employees of automobile factories could not possibly spend their spare time more profitably than by reading a practical automobile journal. Not only will such reading increase their value to their employers, but it will fit them in time to become competent independent repairmen, the lack of whom is now one of the retarding factors of the automobile movement. Of course, in making repairs and in locating troubles there is nothing of such value as actual personal experience, but it is impossible for any one man to learn by actual experience all the varied mishaps and derangements possible with the various classes of automobiles, and in a general automobile repair shop he will constantly meet with new puzzles which, unless he is schooled in the theory of automobile and engine construction, may prove staggerers.

The next best thing to knowing a thing from personal experience is to learn it through others', and the exchange of helpful experiences and practical ideas is to be encouraged. The present rapid growth of the automobile movement will result in the near future in a demand for a large number of men skilled in the care and repair of machines and thoroughly familiar with all the principal types. This line of work is perhaps the one which will offer the greatest opportunities for machinists in the immediate future, and the trouble of preparation for it will be well repaid. We find that manufacturers are inclined to encourage the efforts of their employees to post themselves in the technical principles of their trade, as they should be.

An English Automobile Race Track.

It appears that the first of the many projects of building special automobile race tracks to be put into execution will be that on which the Automobile Club of Great Britain and Ireland has been working for some time. The club has just concluded negotiations with the owner of certain lands, some 12 miles south of London, and has made arrangements whereby it will have the right to hold meetings on these grounds for forty days during the year, and will enjoy certain other privileges. The track to be constructed, which it is expected to complete in a few months, will consist essentially of two long straights, with loops at the ends of sufficient radius to admit of turning at a good speed. The track will have a total length of 7 miles, and will have a rather varied contour, containing grades up to 14 per cent. There is also a stretch of 1 kilometre which is exceptionally level, and it is the hope of the A. C. G. B. and I. that the Automobile Club of France will recognize this as an official track for speed records.

The new track is within easy reach of London, and also not very far from the horse racing tracks at Epsom, so that it is expected that it will prove a great attraction to Londoners, and divert some of the patronage from Epsom. The undulatory character of the course is thought rather an advantage, as it will "test" the vehicles under different conditions, and be better for demonstrating their all around qualities, as well as their drivers' skill. The location of the grounds on which the track will be built is at Purley, on the Waringham side of the Brighton road.

It may be mentioned in this connection that the project of an automobile course on Long Island is still circulating in the public press, particularly abroad. A recent English publication had it that the course was to be reserved for millionaires, and that it was thought the use of the track would result in the early extinction of the race of millionaires.

The Long Island Automobile Club's Floral Parade.

The Long Island Automobile Club is to be congratulated upon its decision to hold an automobile floral parade; not that there is anything particularly novel in such a parade, but because of its possible benefits to the movement and the industry. The L. I. Club has so far shown a decided taste for race organization, but its efforts in this direction at one time brought it into pecuniary difficulties and more than once have subjected it to severe criticism, and possibly it has reached the conclusion that the less "sporty" kind of automobile event is more promising. The floral parade certainly will attract the attention of a greater local public than a race, and fill more persons with a desire to own an automobile.

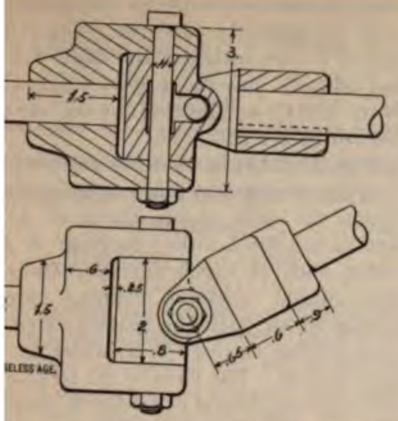
Although a number of floral parades have already been held in this country, we do not remember any in this section, nor any organized as club events, and to the public it will therefore be something of a novelty. The undertaking deserves success and we hope the promoters may be favored with good weather and receive the hearty support of the automobilists of Brooklyn and vicinity.

Universal Joints.

By P. M. Heldt.

Chainless transmission in small, light weight automobiles is gaining in favor, especially abroad. One of the chief advantages offered by this form of transmission is the facility of protecting all wearing parts from dust and grit. With transmission by "propeller" shaft and bevel gears the gears are always enclosed in a metal box on the rear axle, and in the later and better designs of cars effort is also made to protect the universal joints as much as possible against undue wear from grit and dust. This has led to the design of a number of new forms of universal joints specially adapted for such protection.

The main power shaft is, of course, not the only part of automobiles in which universal joints are needed, such joints also

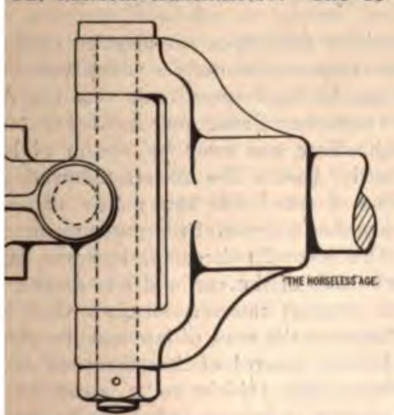


1 AND 2.—PROPORTIONS OF CAST IRON UNIVERSAL JOINT PARTS.

provided in the steering mechanism he operating mechanism of the driv- quipment, but these joints, having to nit a longitudinal thrust instead of a effort, and being subjected to much er loads, are of an entirely different from driving shaft universal joints, ill not be considered here.

universal joint is also frequently in stationary machinery, the most ion form being what is referred to nglish writers as Hooke's joint and by hmen as joint à la Cardan. Fig. 1 ith is after an illustration of Un- Machine Design, with the proportions mended by that authority. It will be o be rather heavy and clumsy in de- and the proportions adopted by au- bile designers differ considerably from here given. The joint consists of orks keyed to the two shafts to be cted respectively and a central or ing part, drilled with two holes at angles. The forks are fitted over this ing part, and are pivotally connected t by means of bolts and nuts.

transmission of rotation by such a is not uniform. That is to say, if the g shaft rotates at a perfectly uniform he driven shaft will have a periodic n passing through two maximum and minimum speeds in every revolution. urse when the two connected shafts line with each other there is no pe- variation in the speed of the driven but uniform transmission. The de-



3.—UNIVERSAL JOINT AS USED IN AUTOMOBILE TRANSMISSIONS.

gree of variation in speed depends upon the angle between the two connected shafts and also upon the distance between the centre lines of the two pins. In constructions in which these two centre lines intersect, thus forming a cross, the periodic speed variation is a minimum.

To gain an idea of the amount of variation in rotative velocity we will assume a universal joint connecting two shafts in the same vertical plane, the driving shaft being arranged horizontally, as in Fig. 4. The centre lines of the two pins intersect each other, the ends of the centre lines through the pins being designated by A A and B B respectively. When the joint is in motion the line A A describes a circle in a vertical plane and the line B B a circle in a plane making with the vertical an angle φ equal to the angle between the two shafts. These two circles are great circles of the same sphere, the common diameter being a line through the point B vertical to the paper in Fig. 4. The points A and B always remain at the same distance, viz., one quadrant of a great circle, and as they move in different directions their momentary speed must be different. The deviation in the direction of travel is the greatest when either the points A or B coincide with the points of intersection of the two circles. When the points A coincide with these points of intersection the angular speed of the driven shaft is smaller than the angular speed of the driving shaft, and when the points B coincide with these points of intersection the angular speed of the driven shaft is greater than the angular speed of the driving shaft. There are four points in each revolution in which driving and driven shaft have the same rotative speed—when the points A and B are nearly at an equal distance from the points of intersection of the two circles in which they travel.

Let the two large arcs in Fig. 5 represent the great circles in which the points A and B travel. Let the point A travel from the point of intersection to the point A', then B will at the same time travel to B', which is determined by the fact that A' B' must be a quadrant. Now lay off from the point B' on the line of travel of point B a quadrant or 90°, which will give the point C. Through A' and C draw an arc of a great circle. Both the angles B' A' C and B' C A' are right angles (because their opposite sides are quadrants), and hence the angle A C A' is a right angle. We have therefore a right angled spherical triangle A A' C, the angle A' A C of which is equal to the angle between the two connected shafts, the side A A' of which represents the angular velocity of the driving shaft and the side A C the angular velocity of the driven shaft at the moment the point A has passed through the point of intersection—in other words, when the pin of the driving shaft is at right angles to the plane through the two connected shafts. Consequently if we can find the relation between A A' and A C we have

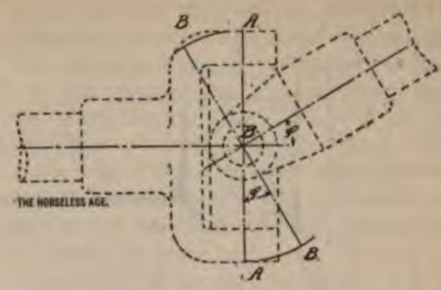


FIG. 4.

the proportion of angular velocity of driving and driven shafts at this moment.

According to the theorems of spherical trigonometry

$$\cos A' A C = \tan A C \cot A A' \ldots . (1)$$

Since the tangent is the reciprocal of the cotangent we may write this

$$\frac{\tan A C}{\tan A A'} = \cos A' A C \ldots . (2)$$

and since for very small angles the tangents are proportional to the angles we have

$$\frac{A C}{A A'} = \cos A' A C.$$

Therefore, when the pin of the driving shaft is perpendicular to the plane through the connected shafts the angular velocity of the driven shaft is smaller than the angular velocity of the driving shaft in the proportion of the cosine of the angle between the two shafts to unity, and similarly when the pin on the driving shaft is in the plane of the two connected shafts the driven shaft runs faster than the driving shaft in that same proportion.

It is also of some interest to find an expression for the momentary ratio of angular velocities for any point in the revolution of the driving shaft, and for the points at which the angular velocities are equal. To simplify the expressions we will denote the angle A' A C by ϕ, the side

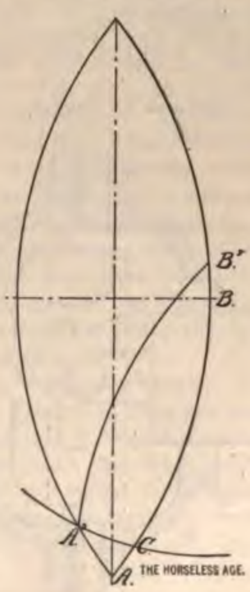


FIG. 5.

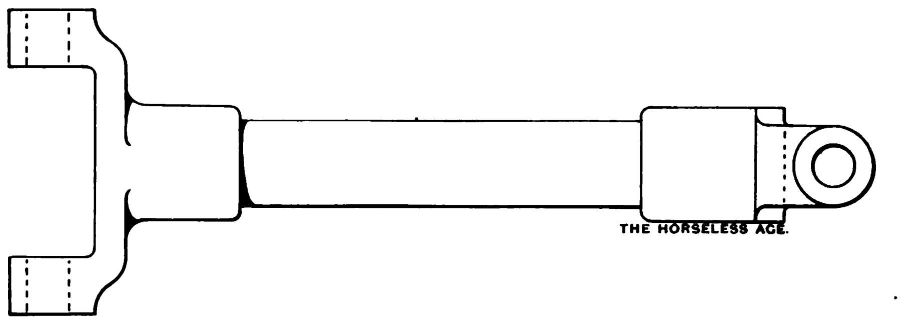


FIG. 6.—ARRANGEMENT OF FORKS ON INTERMEDIATE SHAFT WHEN OUTER SHAFTS ARE APPROXIMATELY PARALLEL WITH EACH OTHER.

A A' by a and the side A C by b. Then we have, as before (equation 1),

$$\tan b = \cos \phi \tan a \quad \ldots (3)$$

Differentiating, we have

$$\sec^2 b \, d\,b = \cos \phi \sec^2 a \, d\,a$$

and

$$\frac{d\,b}{d\,a} = \cos \phi \frac{\sec^2 a}{\sec^2 b} \quad \ldots (4),$$

which gives the ratio of angular velocities at any moment in terms of ϕ, a and b. It is preferable to express the value in terms of ϕ, and a only, as b is not directly known, and the latter can be easily eliminated. Squaring equation (3) we have

$$\tan^2 b = \cos^2 \phi \tan^2 a$$

and

$$1 + \tan^2 b = 1 + \cos^2 \phi \tan^2 a \quad \ldots (5)$$

Since

$$1 + \tan^2 b = \sec^2 b,$$

we may substitute the right hand term in equation (5) for $\sec^2 b$ in equation (4),

$$\frac{d\,b}{d\,a} = \cos \phi \frac{\sec^2 a}{1 + \cos^2 \phi \tan^2 a}, \quad \ldots (6),$$

which gives the ratio of angular velocities after any angular movement a of the driving shaft from the zero position in which the pin of the driving shaft is perpendicular to the plane through the two shafts.

To find the position of equal angular velocities we place the right hand term in the above equation (6) equal to unity,

$$\cos \phi \frac{\sec^2 a}{1 + \cos^2 \phi \tan^2 a} = 1$$

Transforming we have

$$\cos \phi \sec^2 a = 1 + \cos^2 \phi \tan^2 a,$$

and since

$$\sec^2 a = 1 + \tan^2 a,$$

$$\cos \phi + \cos \phi \tan^2 a = 1 + \cos^2 \phi \tan^2 a,$$

$$\tan^2 a (\cos \phi - \cos^2 \phi) = 1 - \cos \phi,$$

$$\tan^2 a = \frac{1 - \cos \phi}{\cos \phi - \cos^2 \phi} = \frac{1}{\cos \phi}$$

$$\tan a = \sqrt{\frac{1}{\cos \phi}}$$

When $\phi = 30°$ we find that $a = 47° \ 3'$. As ϕ approaches zero, the value of $\cos \phi$ approaches unity and consequently that of $\tan \phi$ also approaches unity; that is a approaches 45°.

In automobile transmissions usually two universal joints are used, one at the rear of the gear box and one just in front of the differential gear case, the two being located at opposite ends of a short intermediate shaft. An important question in the design of a shaft transmission is how to reduce the periodic variations in the ratio of transmission to a minimum. This end may be accomplished as follows: The various parts are so arranged that normally the connected shafts are all in line with each other, or at least as nearly as other considerations allow; the intermediate shaft is made as long as possible, so that the angle between the shafts resulting from the spring motion may be as small as possible; the forks or equivalent devices at the two ends of the intermediate shaft are placed at right angles to each other, and provisions are made to keep the two outer shafts parallel when their relative positions are varied by the play of the body springs. When the latter condition is fulfilled the outer shafts may make any angle with the intermediate shaft, and yet the transmission between the outer shafts will be perfectly uniform. The angular speed of the intermediate shaft will vary periodically, but the second joint will always exactly compensate for the variations caused by the first joint.

Fig. 7 shows a form of joint which is latterly coming into much favor in Europe. Upon the ends of the shafts to be connected are fitted forked forgings A A, the outer ends of which extend radially, and are turned smooth, forming journals. These are supported in bearings formed by two annular castings B B, which are bolted together. The hubs of the forks extend through the central openings in these castings, and the openings are made enough larger than the hubs to allow of the greatest angular motion between the shafts that may be expected. The two annular pieces are made with lateral flanges around the central openings, and in the outer surface of these flanges is turned a groove C. This groove serves for fastening a cover of leather or oil cloth, which is also fastened around the shaft behind the hub of the forked forging. Enough slack is left in this cover to allow for the relative motion of the shaft and the annular part.

The four parts of this universal joint are well suited to be made by drop forging, and some enterprising drop forging concern getting out a standard pattern would no doubt find a good market for it.

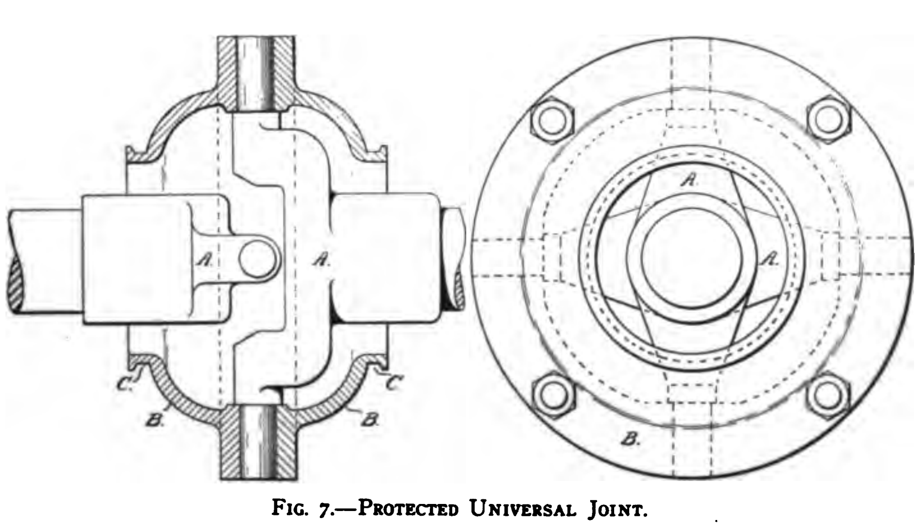


FIG. 7.—PROTECTED UNIVERSAL JOINT.

Calendar of Automobile Dates and Events.

May 14.—Start of Paris-Madrid Tourist Section.
May 20—21.—Commercial Vehicle Contest under the auspices of the Automobile Club of America.
May 23.—Floral Parade of the Long Island Automobile Club, Brooklyn, N. Y.
May 24—26.—Paris-Madrid Race.
May 25—30.—Alcohol Motor Wagon Trials at Berlin.
May 30 — Massachusetts Automobile Club Race Meet.
May 30—Hill Climbing Contest of the New York Motor Cycle Club.
June 18—20.—Paris Automobile Fetes.
June 18—28.—Aix les Bains Auto Events.
July 1—15.—Irish Fortnight.
July 2.—Gordon Bennett Cup Race.

A Speed Arrest Under Difficulties.

Two policemen on bicycles endeavored to stop an automobile which was exceeding the legal speed limit near the Arc de Triomphe, Paris, on April 21, but the chauffeur got away by reason of his superior pace. The officers followed, and at the Rond Point the motor turned and smashed up one of the pursuing machines. The second policeman, however, gripped the side of the car, and was carried along at a great rate. A struggle then ensued between the man of law and the chauffeur for the control of the "throttle," so as to bring the vehicle to a standstill. The spirited encounter ended by the arrival of more policemen, who drew across the roadway, compelling the motor to stop.

LESSONS OF THE ∴ ROAD ∴

rience with Three Gasoline Automobiles on the Poor Roads of Illinois.

By Chas. L. Turner.

(Concluded.)

reached our destination without any ents which would interest your read- There we learned that the owner had it unpleasant to remain. The auto- le had been well advertised and peo- ad come for miles to see it, only to be pointed, so that the fair managers not at all pleased to see us when we rrive. We found that the owner had or Wyoming, some 60 miles distant, ting to head us off there, but we to pass through there. So there ed nothing to do but turn about and back to Wyoming. There we found wner, and there my friend left us for a.

ad occasion to leave the owner and vehicle together alone one day and my return found that he had been g some rides by himself, but had let ngine race so fast as to

CRACK THE CYLINDER

the crank box. This necessitated a o the machine shop, and while there I the vehicle a good overhauling. A or patch was riveted to the cylinder the crack and seemed to make it as as new. After this the owner and I d Lafayette, Toulon, Galesburg, Came, Kewanee and other towns of more ss note. Before reaching Galesburg et with two accidents that are worthy tice. On ascending a steel hill near Jersey (the steepest encountered on whole trip) the reverse belt in some er became caught in a slipper, broke wrapped around the front pulley. I diately put on the brake, locked it the little catch noted before, took the n belt out at my leisure and fixed it. wagon stood as stable as on level d, thus showing what a good feature d brake dog or brake latch is.

nearing Galesburg we struck some level, smooth roads, the finest found e whole trip of 600 miles, and as we a little late I put on the third speed, on good roads made better than 20 per hour. We were just getting un- ood headway when I noticed the left lean in toward the body, and the thing I knew my friend was on the d and I came down with the rear end e wagon. Investigation disclosed that ft wheel had broken off between the ng knuckle and spring. A plainly flaw revealed the cause. The left breaking off caused the right one to off at the spindle, so that the whole end of the wagon went down and al- caused the wagon to turn a somersault. Nothing else was damaged about the wagon except that one battery cell broke. My friend's stiff hat was broken all up and I got a bad cut on the calf of my leg. To repair the wagon this time cost $31, about twice what it was worth, but we needed the wagon, and the man the money—and he got it.

At Galesburg we had a race with a heavy single cylinder automobile. This was to be a race of 50 miles on the Williams track and was the first race ever held in the Middle West that I know of. The track was a fine mile track, in good condition, and a large crowd was in attendance. The race, however, terminated in the thirteenth mile by a sparker breaking in our machine. These sparkers were of the hammer and break style and gave me lots of trouble. I learned afterward that I gave the hammers too much throw, thus causing them to break.

Soon after this race I parted from the owner, and also the automobile. I was really sorry to part with the latter, as I had had many enjoyable rides with it. The low speed was such that I never knew the engine to get stalled; it would climb any hill and never got stuck in the mud. From close study I had learned it and mastered it, and it is said by those who know (myself included) that there has never been a better running automobile in Peoria since than that old patriarch. I have now lost all track of it.

A PIPE REPAIR.

One more repair should be mentioned which may be helpful to someone, although many are now familiar with it, viz., repairing a broken gasoline pipe with rubber. One day when riding along a coil in the gasoline pipe snapped in two and the engine came to a stop. At first I thought I was surely "done for," when I happened to think of the foot pump. I soon cut off a piece of rubber tube, slipped it over the broken ends of the tube, tied some twine around each end, and went on my way rejoicing.*

My next experience was with a three wheeler of a well known make. This was equipped with a three cylinder motor, very powerful, but it being one of the first machines turned out the working parts were not of the best and it gave more or less trouble. The later models give good satisfaction. This had not been in my possession long before a young man just starting a repair shop wanted it for experimental purposes, and I let him have it.

ASSEMBLES A MACHINE HIMSELF.

My third experience was with a machine built in 1901 by a cousin and myself. The engine is a 5x6 inch single cylinder one with 24 inch flywheel. The engine, gears, transmission and all parts, with the exception of body and tires were bought of a supply house in St. Louis. The wheels are of wood, of the artillery type. For ignition we use the auto sparker, not using batteries at all, and have always had plenty of sparking current. The body cost us $40. The whole machine, including paint, fenders and upholstering, cost us about $650, not counting our time. We did all our own blacksmithing and assembling. This rig we have run over 2,500 miles, and the repairs have been very little. I would not advise one unacquainted with automobiles to attempt to build one.

*Rubber tube would only suffice for a very temporary repair, as gasoline dissolves rubber.—Ed.

In summing up my experience of four years with the three types, I consider the light weight automobile weighing less than 1,000 pounds, with single cylinder engine, to be best adapted to the needs of the average man or woman. But to the man who tours some the multiple cylinder will give better satisfaction, and for our bad roads here three speeds ahead are almost a necessity. The first one should be quite low, and if there be plenty of weight on the drivers one can get through all but spring mud successfully. After reading the different articles in The Horseless Age I am positive that common dirt roads are not nearly as hard on tires as your hard macadamized roads of the East. The tires we are using now are 3 inch single tubes made by a well known firm in the East. They have been run almost continually on dirt roads for 2,500 miles, and yet all are apparently as good as new; they are airtight and have never been punctured.

CAUSE OF DIFFERENCE IN TIRES.

Regarding the matter of one tire outlasting others, of which much is written, will say that for a year or more I had charge of sending out new tires and receiving old ones for repair in a tire factory at this place. I soon noted a big difference in the durability of tires made on different dates. Sometimes the difference was due to the raw rubber worked up, sometimes to the mixture of compound, and again to the molding. The difference in any one batch hardly ever occurred on any one day, and in this factory, as each tire was made separately, it shows that there might be a difference in the makeup, which of course there undoubtedly was. The tires were cooked or molded in lots of five to each press, so that there should be five molded alike. The five on the next press might be a little different. So I am led to believe that the fact of one tire outlasting others is due to differences in the tires and not in the running. Tires all bearing the same date of manufacture should all wear alike, and just which are the good ones to buy can only be told by the look and feel of the tire by an experienced hand.

As to running expenses of the three wagons, I failed to keep any account. But the expenses of any of them, repairs and all, were much less than keeping a horse and the enjoyment far greater. On an average the two cylinder wagon used 1 gallon of gasoline to every 15 miles, the three cylinder 1 gallon to 16 miles (it being much lighter), and the one cylinder 1 gallon to 17 miles. The expense for cylin-

der oil was about the same on all three wagons. My experience is that Robin Damon is correct when he says that repairs are more frequent during the second year than the first. The last wagon for the first year ran splendidly, scarcely any parts breaking, the repairs amounting to scarcely anything. This last year several parts broke, including the crank shaft, but as we did most of the repair work ourselves the cost amounted to little.

CONCLUSIONS.

In conclusion let me say to the beginner that I know of nothing more enjoyable than a nicely running automobile. The novice on first getting his machine should study it thoroughly—not take it all apart and try to make improvements right off, for the manufacturer usually has his machine fairly well up to date, but reason things out and try to grasp the why and wherefore thereof. Not long ago I was called downtown to examine a new light weight machine which the owner had taken apart because it wouldn't run properly. He had put it together again, but on starting the engine it would run for a minute and then choke down from a surplus of gasoline, this liquid even dripping from the valves at the head of the engine. I concluded that the overflow was stopped up, but on examination it was found open. Next I asked about the needle point of the gasoline valve. The owner stated that he had not touched it, but I unscrewed it and found the packing wound so that the valve would not close by a full turn. Thus when opening it one turn I really opened it two turns. I fixed the packing, put in the valve, started the engine and the job was done. He admitted having had the needle valve out, as he wanted to know all about how the auto was made. This particular lesson cost him $1. He has since learned to think and is now quite an enthusiast. It takes time to let some of the intricate parts of a gasoline automobile soak into your brain, but finally it all becomes clear; and as to repairs, they are a pleasure to one mechanically inclined when not too many. I am employed about other work usually eight to ten hours daily and yet have ample time for rides mornings and evenings and what little repair work is to be done. I never do any of this on Sunday, but sometimes take a ride on Sunday afternoon, and strange to say, I have never yet had a breakdown on that day. Possibly I am more careful and I know I never drive so fast.

Impressions After a Year's Use of an Automobile in Actual Practice.

By William G. Curtis, M. D.

A year's experience with an automobile is too short for a presentation of statistics or any but general conclusions.

My problem was to do away with the many disadvantages of the horse in a suburban district where the roads average good but some steep hills are encountered.

After a season's experience with a gasoline launch as my only preparation I purchased a gasoline vehicle and began my course in "taught at home" automobile engineering.

My machine is a 1,200 pound one seated car, driven by a 7 horse power single cylinder water cooled gasoline engine. Ignition is by make and break spark. There are two speeds forward and a reverse.

I have solved the storage question in a most satisfactory way by building a room in the basement of my house, where the floor is on the same grade as the yard outside. A steam pipe passing through this room keeps it warm enough to overcome difficulties of starting in cold weather, and it is a delight when everything is in perfect running order to be able to step into the basement, crank the machine, and in less than two minutes be on the road.

To keep the machine in perfect running order is the whole problem, and one's success in doing this determines whether or not the automobile is a practical tool for him.

My first weeks were full of annoying troubles and some large bills for minor repairs, which taught me that economy over the horse meant that I must be my own machinist, and it was not until I emancipated myself from the auto repair shop and agent that I began to learn my lesson.

My difficulties have all been so called minor troubles, most of which ought to be made impossible in the machine of today. My "contact spark" device has been so satisfactory in operation that I should be loath to change to the more fashionable jump spark, although it is a severe drain upon my batteries and my bill for batteries equals that for gasoline. I have lately installed an igniter which promises to be more economical.

Troubles with the water circulating system have given me the greatest annoyance. The chain which drives the pump will occasionally jump off and if not discovered in time allows the engine to overheat. I should insist today upon a gear driven pump; also that the head and cylinder be cast in one piece, doing away with the gasket, which has caused my most serious troubles, by burning out and allowing the cooling water to leak into the cylinder.

My friction clutches require too frequent adjustment.

My early rides were almost always interrupted by the chain jumping from the rear sprocket, until I had new and much larger sprockets and chain fitted, and since that time this trouble has never recurred, and the wear on chain and sprockets is hardly perceptible after three months' constant use.

I wore a pair of 3 inch single tube pneumatics down to the canvas in three months. Then I discovered the cause in the front wheels being out of alignment. The next three months after the trouble was remedied showed practically no wear on the front tires. My ball bearings call for frequent adjustment and the cones wear rapidly. The wood "artillery" wheels give complete satisfaction. I have had no carburetor troubles. In fact, I am unacquainted with my carburetor for this reason.

I use my machine every month in the year. I believe there is hardly a day when I could not run it, but from motives of economy and personal comfort there are many days when I do not take the carriage out.

When the snow is deep and heavy and excessive slipping occurs, I find no satisfaction in running on the slow speed. When the roads present a certain condition of icy roughness the wear on the tires is excessive. There must soon appear some effective method of shoeing tires for winter use, both to give a better grip on snow and ice and to prevent skidding and wear. Such an invention will greatly diminish the number of days when the machine will remain in the stable.

I have never resorted to "anti-freezing" mixtures. There are few days when the water will freeze during a fifteen minute stop, and on those days I keep the engine running slowly. It is here that the air cooled motor is a very tempting proposition to the physician.

After a year's experience I have no desire to return to the horse, but look upon the auto as a practical institution, even in its present state.

As a source of pleasure and diversion, not only for the owner, but his family and friends as well, it is, to my mind, unrivaled by any means of locomotion, and in my experience it is less expensive to maintain than the horse.

A Private Garage.

The practice of wealthy owners of two or more automobiles to establish and conduct their own private garages, is growing rapidly. One of the leading automobilists in this country is C. K. G. Billings, of New York, who now owns three foreign made gasoline cars and is about to purchase two more of the same kind and one electric. He has opened within the past week a garage at 172 East Seventy-fifth street. It is fully equipped for every branch of work done at the public garages, will accommodate eight machines and has attached a well appointed machine shop. Two chauffeurs, a machinist and a washer are employed, and this force will be added to as soon as the new cars are brought in. The building is four stories high, 25x100 feet, and only the ground floor is used for the cars. The upper floors are used for apartments by the employees.

Maintenance. and Repairs.

III.—How to Increase the Capacity of the Boiler Feed Pump.

By W. O. Anthony.

DEFICIENT BOILER FEED.

The boiler feed pump is usually driven by a slotted lever from a pin in the cross-head, and with the pump new and in good condition it delivers a none too plentiful supply. Lost motion in the various joints, resulting from wear, aggravates its insufficiency. Many times, however, leaky check valves are more accountable for too slow feed than wear, and in this case the valve should be removed from its chamber and lightly ground with grindstone grit and oil. Sometimes foreign particles, such as pieces of straw or scale, get into the water tank, and getting caught under one or the other of the pump valves prevent proper working of the pump.

A rather prolific source of trouble arises from the corroding of the needle valve which closes the bypass or return from the pump to the tank. The result of this is to allow more or less of the water which should go to the boiler to leak past the bypass valve and into the tank. This is easily remedied by putting the needle valve rod into a chuck in the lathe and running at high speed, renewing the point at an angle of about 30 degrees with a file.

If it is not known positively whether this valve leaks, this may be readily ascertained by disconnecting the hose which leads from the bypass to the tank and jacking up one rear wheel. If the needle valve is not closed tightly and the engine is started, any leak by this valve will be indicated by a flow of water out of the bypass.

INCREASING THE CAPACITY OF FEED PUMPS.

The writer has bushed the plungers of many feed pumps, making the diameter nine-sixteenths or five-eighths inch instead of one-half or nine-sixteenths inch, respectively. As this is quite readily done and the results thereafter justify the work, the method will be described. Fig. 8 shows a section of a representative type of feed pump. The first step in bushing the plunger A, to increase the capacity of the pump, consists in sawing the old plunger off at a point just above the piece carrying the wrist pin B. This distance is generally about five-eighths inch. While in this condition the wrist pin and its hole in the connecting rod *c* may be conveniently bushed or removed, for if the pump has been long in use this will generally be desirable. It is better, as a rule, to put in a new pin. Drive out the old pin and ream the three holes together, to fit tightly a piece of drill rod. Now enlarge the hole in the wrist pin end of the connecting rod an almost imperceptible amount by reaming or drilling, and put the rod back into place.

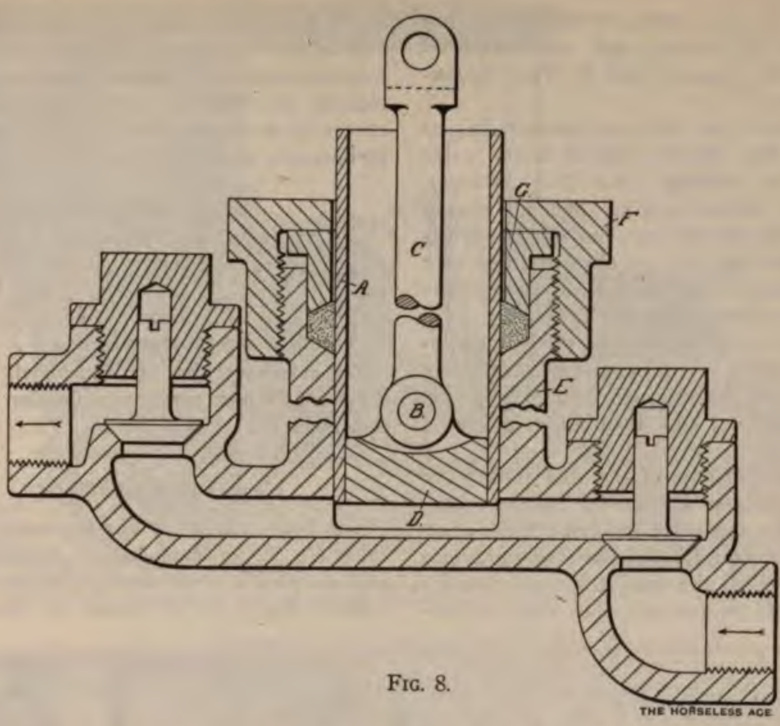


Fig. 8.

Countersink the outer ends of the holes in piece D slightly and drive the new pin into place, saw off nearly flush and rivet the ends tightly into the countersink.

If the original pump plunger was one-half inch outside diameter and it is to be made nine-sixteenths inch, procure a piece of brass tubing nine-sixteenths inch diameter and one-thirty-second inch thick. Cut it to the same length as the old plunger, and with a small soldering iron tin the inside of one end to a depth of five-eighths inch or so. Now tin the outside of the part of the old plunger remaining, and applying heat from a blow torch or soldering iron until the solder upon both parts is melted, tap the new part down over the old, and when cool a very firm joint will result. File away any surplus solder around the bottom.

Now mount the pump body E in the lathe chuck and true by the bore very carefully. Bore out and finish to a diameter which will just allow the new plunger to slide easily therein. Do the same with the screw cap F and the gland G. This completes the alterations upon the pump.

The English Eliminating Trials.

We have already briefly given the results of the eliminating trials of the A. C. G. B. and I. for the Gordon Bennett cup race. The trial was held on the Duke of Portland's estate at Welbeck on Saturday, April 25, and on the Dashwood hill on Sunday, April 20. The first part was witnessed by large crowds. Although the meeting had not been advertised, and admission was restricted to members of the Automobile Club and their friends, there were 150 motor vehicles in the fields adjoining the course at Welbeck, and fully 3,000 spectators.

The timing was done by an automatic electric device, designed by Robert E. Phillips, and the times were independently taken by five certified timekeepers.

The competing cars were three Napier cars, driven by J. W. Stocks, the Hon. C. S. Rolls and Mark Mayhew respectively, and one Star car, driven by J. Lisle, Jr. The Napier cars were similar, except that the one supplied to Mr. Mayhew had an engine said to be considerably smaller than that driven by Mr. Stocks and Mr.

Hon. Chas. S. Rolls on a Napier at Welbeck.

Rolls. The Star car is fitted with a four cylinder 6x6 inches, and was fully described in a recent issue of THE HORSELESS AGE.

Mr. Rolls was at the outset traveling as fast as Mr. Stocks, but a faulty valve ruined his running. Mr. Mayhew's car, with its smaller engine, had no chance against Mr. Stocks' car, but it was slightly faster than the Star car down hill and very much faster than it up hill, in spite of the tremendous engine of the latter.

In the first trial over the total of 3 kilometres down hill Stocks was faster than Rolls by 10 3-5 seconds, than Mayhew by 22 3-5 seconds, and than Lisle by 20 2-5 seconds.

The second part of the trial took place on the Dashwood hill early Sunday morning. After the trials at Welbeck the competitors were informed that the particular hill on which the final trials were to be held would be announced to them at midnight on Sunday at a rendezvous at Banbury, to which town all competitors were to proceed forthwith. Messrs. Rolls, Stocks and Mayhew drove their cars 89 miles to Banbury on Saturday night as directed. The Star car was driven over on Sunday. The secrecy maintained in regard to the place of the hill trial is said to have been thought advisable, for the reason that another hill climbing test, arranged by the A. C. G. B. and I. some time ago, was prohibited by the police.

The drive from Banbury via Oxford to Dashwood Hill was made in a downpour of rain. By 3:45, when dawn began to break, the timekeepers were in their places, and shortly afterward Mr. Rolls' car and, at intervals, the other three cars ran up the hill. This was repeated three times.

Dashwood Hill is 33 miles from London. It has an average gradient of 1 in 15 and is quite straight, and there is a distance of 1,180 yards from the milestone at the foot to the danger board at the top. The road was in a very heavy condition. Taking zero as the fastest time made by any competitor, the following list shows in seconds and fifths of seconds the time in excess of the fastest time occupied by the various cars in making the ascent:

	1st Ascent. Seconds.	2d Ascent. Seconds.	3d Ascent. Seconds.
Stocks	5 4-5	0	27 1-5*
Rolls	6 4-5	4	0
Mayhew ..	23 4-5*	1	1.2
Lisle	30	25.1	23

* Stopped engine when starting at foot of hill.

The result was that Mr. Stocks will drive the third Napier car in the Gordon Bennett race.

J. LISLE ON STAR CAR AT WELBECK.

New Incorporations.

The Duquesne Motor Car Company, Buffalo, N. Y., to manufacture automobiles and automobile parts; capital, $50,000; directors, Harry Howe, Harry G. Johnson, L. Ray Pelletier, John Fraser and John B. Uster.

The Niles Automobile and Gas Engine Company, Niles, Mich.; capital stock, $25,000.

Knickerbocker Auto Car Company, of New York; capital, $5,000; directors, O. T. Sherman, J. F. Couch and Dixie Hines, of New York.

The Vehicle Equipment Company, New York, N. Y.; capital stock, $3,000,000; incorporators, Martin Conboy, H. T. L. Mead and Henry Schoenherr.

The Nelson Gas Engine and Automobile Company, Harlan, Ia.; to buy machinery and appliances for the manufacture of automobiles and gasoline engines; capital stock, $50,000; directors, N. M. Lana, T. K. Nelson, E. E. Dunmore, M. E. Lana and A. H. Nelson, of whom T. K. Nelson is president, A. H. Nelson vice president, and E. E. Dunmore secretary and treasurer. The company's factory, 40x100 feet, and foundry, 40x40 feet, are nearly completed and they intend to start in business on June 1.

The Schaeffer-Bramley Company, of Lockport, N. Y.; to manufacture automobiles; capital, $8,000; directors, W. E. Schaeffer, J. W. Bramley and J. H. Bramley, all of Lockport.

The Effect of the Automobile Movement on the Horse and Allied Trades.

The triumphal progress of the motor car is not being accomplished without some injury to other industries.

Those that depend upon the manufacture of accessories to horse traction are naturally the first to suffer. The car is bound to displace a certain number of horses, and this in turn has an immediate effect upon such trades as harness making and coach and carriage building.

During the last three months, besides the enormous number of cars manufactured in England, the imports from abroad have amounted in value to the heavy total of over half a million sterling.

The first effect that this has had is to revolutionize the carriage building trade. The old, heavy vehicles are out of the running. Carriages, even when built for horses, now have to be light. Old broughams are being sold by the hundred, and barouches have gone completely out of fashion. The latter figure in every sale of vehicles, and the utmost price they can be relied on to fetch is £6—exactly the value of the wheels.

In London the effect has not so far been serious, at any rate among the leading firms.

They all agree, however, that it has made some difference, that country makers have suffered very severely, and that some of them are being driven out of business. The number of unemployed in the harness making trade has for some time past been considerable all over the country, and seems to be on the increase.

"Until the regular price of the best cars falls to £300 we have little to fear," said one manufacturer. "When that time has come the motoring rage will have ceased. Nor must it be forgotten that a man who is wealthy enough to buy cars today frequently keeps his horses just the same as before; many people also buying cars who have never owned horses.

"Fashions change, and in one respect we are doing very well. The demand for saddles has never been so great. Every person who went out to South Africa during the war thinks it well to display his horsemanship on Saturday afternoons. And it is a display, but still it sends up the demand for saddles."

In other quarters great pessimism is manifested. The loss on sales is admitted and placed to the account of the motor car, and one maker says that he is now paying out £50 a week to his workpeople where he had previously paid £150.—*London Daily Telegraph.*

W VEHICLES AND PARTS.

: New Two Cylinder De Dion Engine and Car.

Dion & Bouton entered the manu-
·e of motors for self propelled vehicles
eight years ago with a three-quarter
power air cooled tricycle motor, and
have since constantly added new sizes
otors to their list. The air cooled
rs for cycles were gradually increased
ze, until in 1900 a practical limit of
: 3 horse power was reached (not
dering special motors for racing cy-
Up to that time the greater part of
business of the company had been in
oled engines, 15,000 of this type hav-
been manufactured to the middle of
but with the decline of the motor
(tricycle) the water cooled motor for
cars took the lead among the com-
s manufactures. The first type of
ion voiturette (or motorette as it was
l in this country) was fitted with a 3½
power single cylinder engine. This
ollowed in 1901 by a 4½ to 5 horse
r voiturette; in 1902 by an 8 to 9
power single cylinder tonneau; late
me year by the 6 horse power "popu-
voiturette, and very recently a two
ler 10 to 12 horse power motor and
ng car, which are the subject of this
e, have been brought out. One of
two cylinder motors was shown at
Pierce stand at the Madison Square
en Show, but none of the two cylin-
cars have yet been brought to this
ry. We will commence by describ-
e motor.

: cylinders are 90x110 millimetres
it 3.6x4.4 inches), the same as that of
horse power motor of the "popu-
voiturette. The two cylinders, their
and valve chambers, are cast in a
: piece. Openings of considerable di-
r are left in the inner wall and jacket
: head, and are closed by shouldered
, a stud and clamp nut. The piston
he usual De Dion construction, equal
gth to the bore and with the piston
eld in place by set screws with taper-
oints.
hough splash lubrication has been
oned, the bottom of the cylinders is
losed by a plate to prevent an undue
nt of oil getting into the cylinders.
cranks are set at 180° and the crank
are completely balanced, the outer
extending an equal distance to both
of the shaft centre. The crank has
two bearings, and the bearing on the
eel end of the shaft is considerably
r than the bearing on the opposite

: crank case is of aluminum and is
l in a horizontal plane through the
: of the crank shaft. The lower half
e casing may be removed without
ng the crank shaft, as the bearings
latter are entirely supported by the

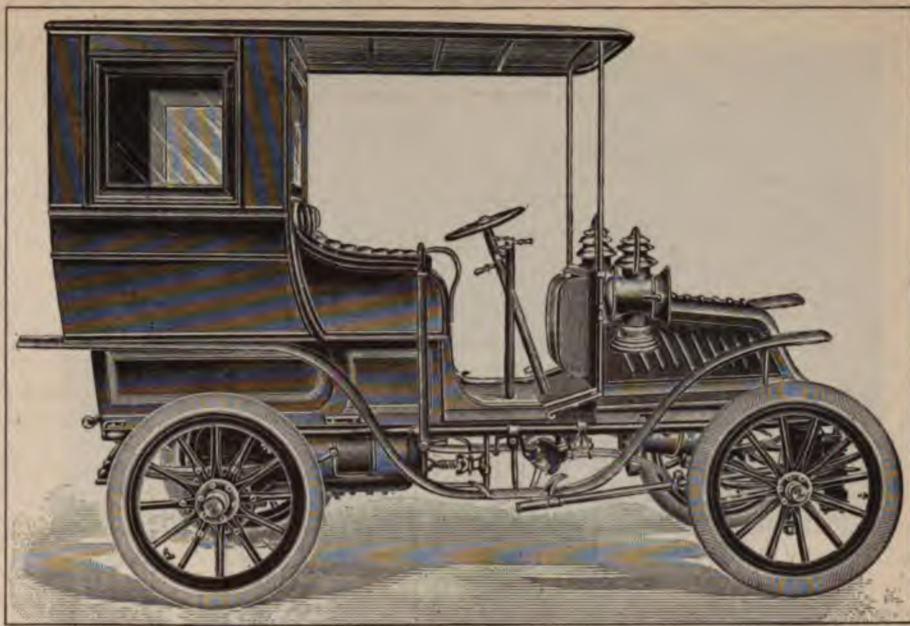


FIG. 1.—DE DION-BOUTON TWO CYLINDER CAR WITH INCLOSED BODY.

upper half of the casing. These bearings are adjustable. The upper half of the casing is cast with brackets (Fig. 2), which are drilled and serve to support the motor on the tubular frame.

The arrangement of the valves and valve gearing is essentially the same as in the single cylinder De Dion motors. The intake valve is located above the exhaust valve, and is operated automatically, and the exhaust valve is operated by the usual variable lifting device, consisting of a lever arm A, one end of which is mounted on a small crank B, and the other end of which is provided with a roller, and is interposed between the cam C and push rod D. The cams and variable lifting device are located in a chamber separated from the crank chamber by a wall, and can be gotten at by removing a cover E. The lift of the exhaust valves is varied by means of a lever, seen in Fig. 2, at the end of the casing, inclosing the variable lift mechanism. This lever is connected by links, etc., to a small handle on the steering post column of the car.

The flywheel of the engine is located outside the crank case, which is a departure in De Dion design; it is 15 inches in diameter, and has a run of 2 inches face and 1¾ depth. It is bolted to a flange on the crank shaft. Since the transmission gear of this car is on the individual friction clutch type the flywheel does not comprise a friction clutch, but has fastened to it instead a universal joint F for the transmission shaft to the change gear.

Among the particularly novel features of the engine is the system of lubrication. An oil tank is located at the side of the cylinders opposite the valve chambers (Fig. 2), and is connected by copper tubes to two oil passages G G in the two end walls of the upper half of the crank casing, respectively. These passages lead to the crank journal bearings. Holes are drilled into the crank

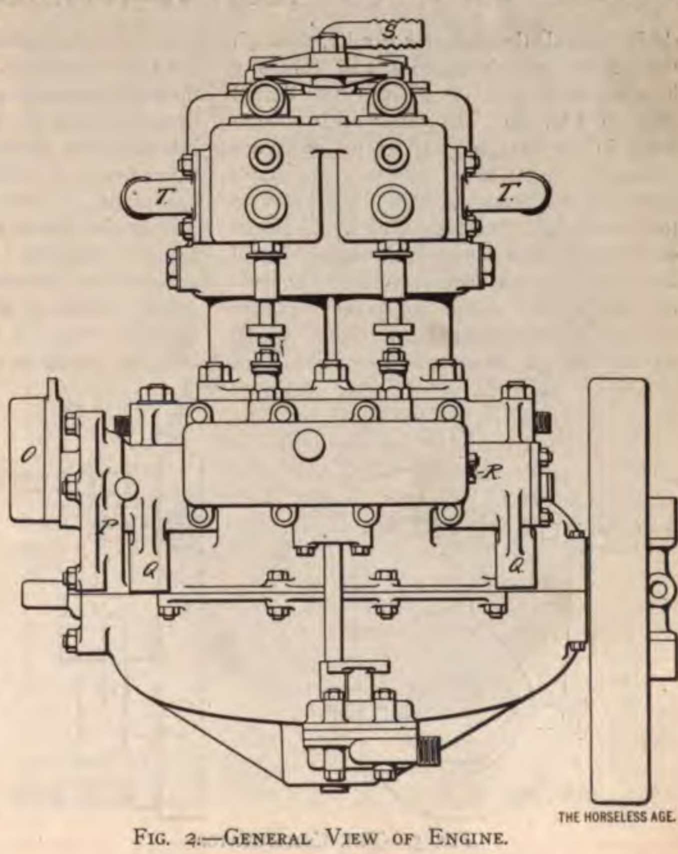
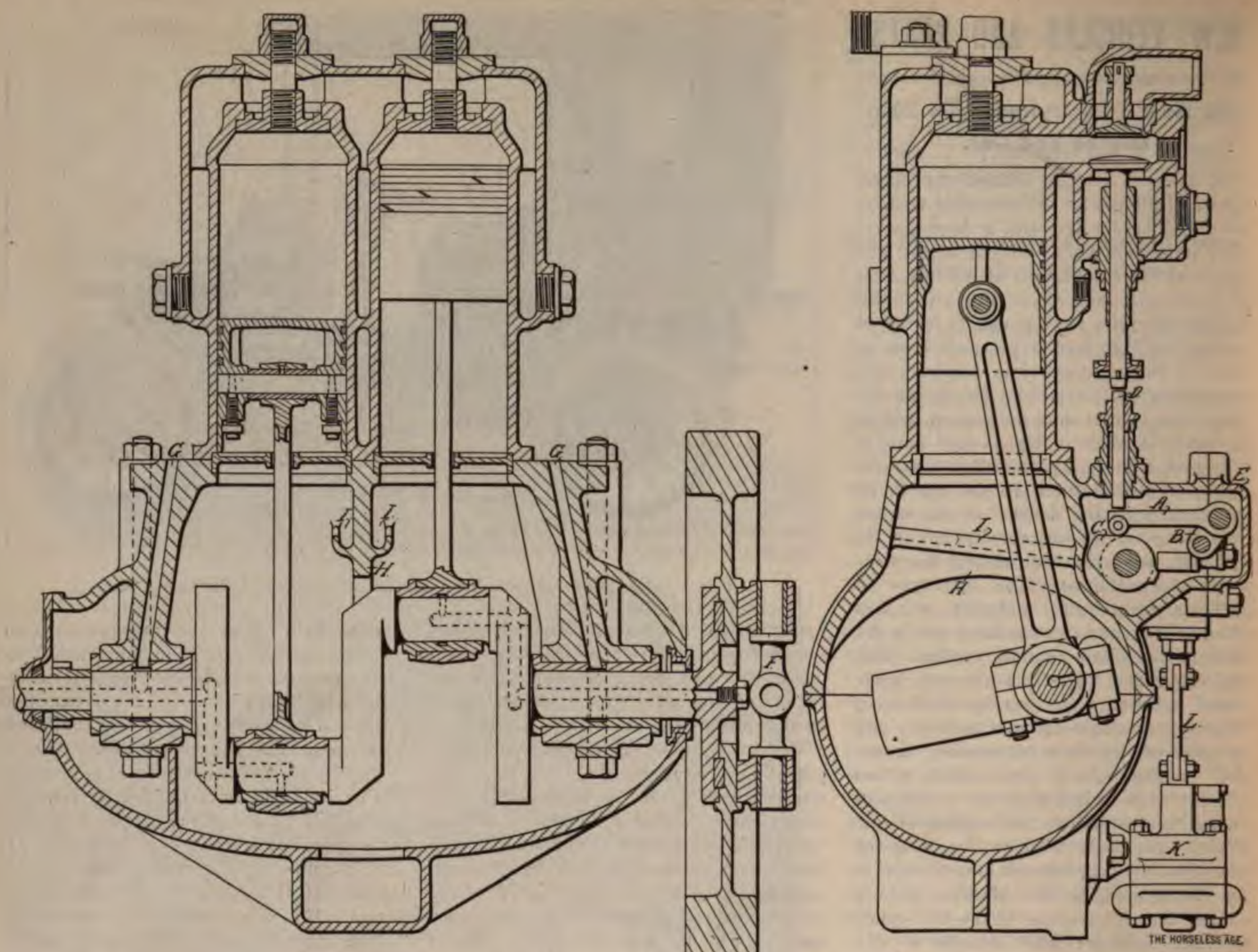


FIG. 2.—GENERAL VIEW OF ENGINE.



FIGS. 3 AND 4.—TWO VERTICAL SECTIONS THROUGH ENGINE.

shaft journal, through it centrally, through the crank arm lengthwise and centrally into the crank pins (as indicated by dotted lines in Fig. 3.) The outer ends of the holes in the bearings and crank arms are plugged. A part of the oil fed to the crank shaft bearing flows through these holes to the crank pin bearing, centrifugal force causing it to flow outward through the drill hole in the crank arm. As the outer ends of both of the crank shaft bearings are within the crank chamber, all the oil which works through these bearings collects in a well G at the bottom of the lower half of the crank chamber. The oil which works through the crank pin bearing is, of course, flung off, and an effect similar to splash lubrication is thereby secured, although it is not nearly so strong. This effect is taken advantage of for lubricating the cam mechanism which, as stated, is located in a separate chamber. Centrally across the upper part of the crank chamber extends an arched bridge H which is formed with an inclined trough I on either side, opening into the cam gear chamber. A part of the oil thrown off by the crank arms and connecting rods is caught in these troughs and is led off into the cam gear chamber.

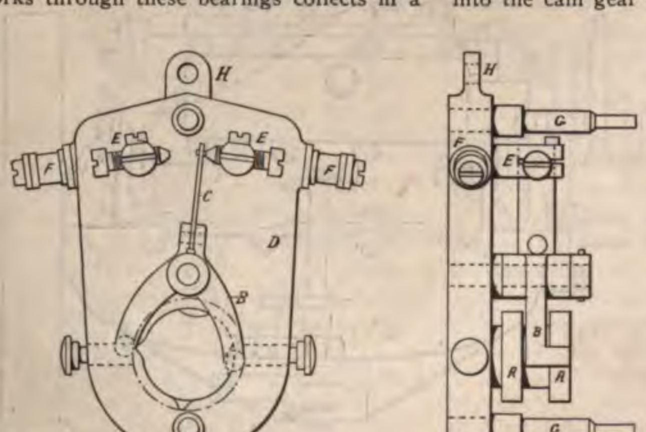


FIG. 5.—THE COMMUTATOR.

All the oil finally collects in the well or pit at the bottom and is then pumped back to the reservoir at the side of the cylinder by means of a small gear pump K fastened to the lower half of the crank chamber. This pump is driven by spiral gears from the cam shaft through a vertical jointed shaft L.

The commutator is located on the front side of the crank case, and has been given a novel form to make it more compact. On the end of the cam shaft, outside the case, are mounted two cams A A, each provided with a circumferential protuberance and depression, the protuberance on one being approximately opposite the depression on the other and 90 degrees from the depression on it. These cams act upon a double armed rocking part B, of caliper shape, pivoted on a stud on the base plate D of the commutator, and provided with a straight flat spring metal strip C. One arm of the rocking part coacts with one of the two cams, and the other arm with the other cam. When the end of one arm is moved radially outward from the cam centre by the protuberance on its cam the end of the other arm is allowed to move inward toward the cam by the depression on its cam surface. In this manner the metal strip or spring C is moved once in each direction from its central position during every revolution of the cam shaft. The end of the metal strip C is provided with platinum contact points, and on opposite sides of the strip are arranged contact screws E E on posts rising from the

base plate D. These contact screws are in electrical connection with binding posts F F respectively, fastened to the side of the base plate D. It will be readily understood that as the cam shaft rotates it causes the part B to rock first in one direction and then in another, and the spring C to make and break contact with the two contact screws E E alternately. A cover is fastened to the posts G G, and the lug H at the top of the plate serves to connect a link to, for rocking the plate around its support concentric with the cam shaft, to vary the time of ignition.

(To be continued.)

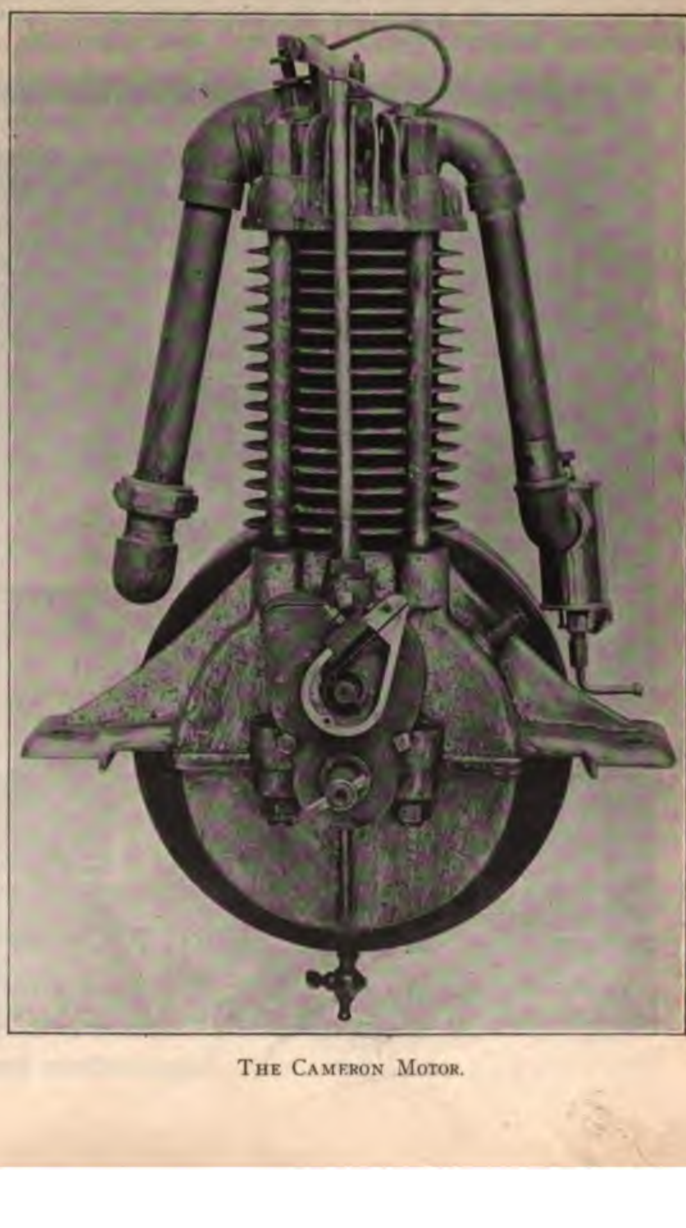
The Cameron Light Gasoline Car.

The United Motor Corporation, of Pawtucket, R. I., have in process of construction fifty vehicles of the type herewith illustrated. As the illustrations show the vehicle is of the light gasoline runabout type, equipped with an air cooled motor arranged in front. The motor has a bore of 3⅞ inches and a stroke of 4 inches; its normal speed is 1,200 revolutions per minute, and the rated power is 5 horse power. The flanged cylinder is clamped to an aluminum crank case by means of four studs, which also hold the cylinder head in place. Both valves are located in the head of the cylinder and open directly into the combustion chamber, the exhaust valve being operated mechanically by means of a valve rod and lever and the intake valve automatically. In order to save space the exhaust valve is held to its seat by means of a flat spring instead of the usual coiled spring. The cam shaft gears and exhaust valve cam are enclosed. The engine is provided with an outside flywheel of considerable diameter.

The Cameron Gasoline Car.

The vehicle has a sliding gear transmission giving two speeds forward and one reverse, and a bevel gear drive to the rear axle. The reduction of speed from the engine to the rear axle for the high gear is in the ratio of 5½ to 1. The wheels are of the steel suspension type, 28 inches in diameter. The wheel base is 72 inches and the tread 40 inches, and the car complete weighs 600 pounds. The body is suspended on semi-elliptic springs in front and full elliptics in the rear. The car is steered by a hand wheel, and the gear is changed by a hand lever. A pedal serves to throw out the engine clutch and also to apply a brake on the transmission shaft forward of the transmission gear. The motor will be seen to be surrounded by a form of bonnet, with a wire netting panel in front, and openings on the top and on the sides. The car is equipped for operation from the left hand side. The car is built from de-

Front View of Cameron Car.



The Cameron Motor.

signs of Mr. Cameron, of the United Motor Corporation, and the machines are now building at the factory of James E. Brown in Pawtucket. We understand that the factory equipment is being added to, and that parts for 100 more of these vehicles have been ordered.

A New Dyke Machine.

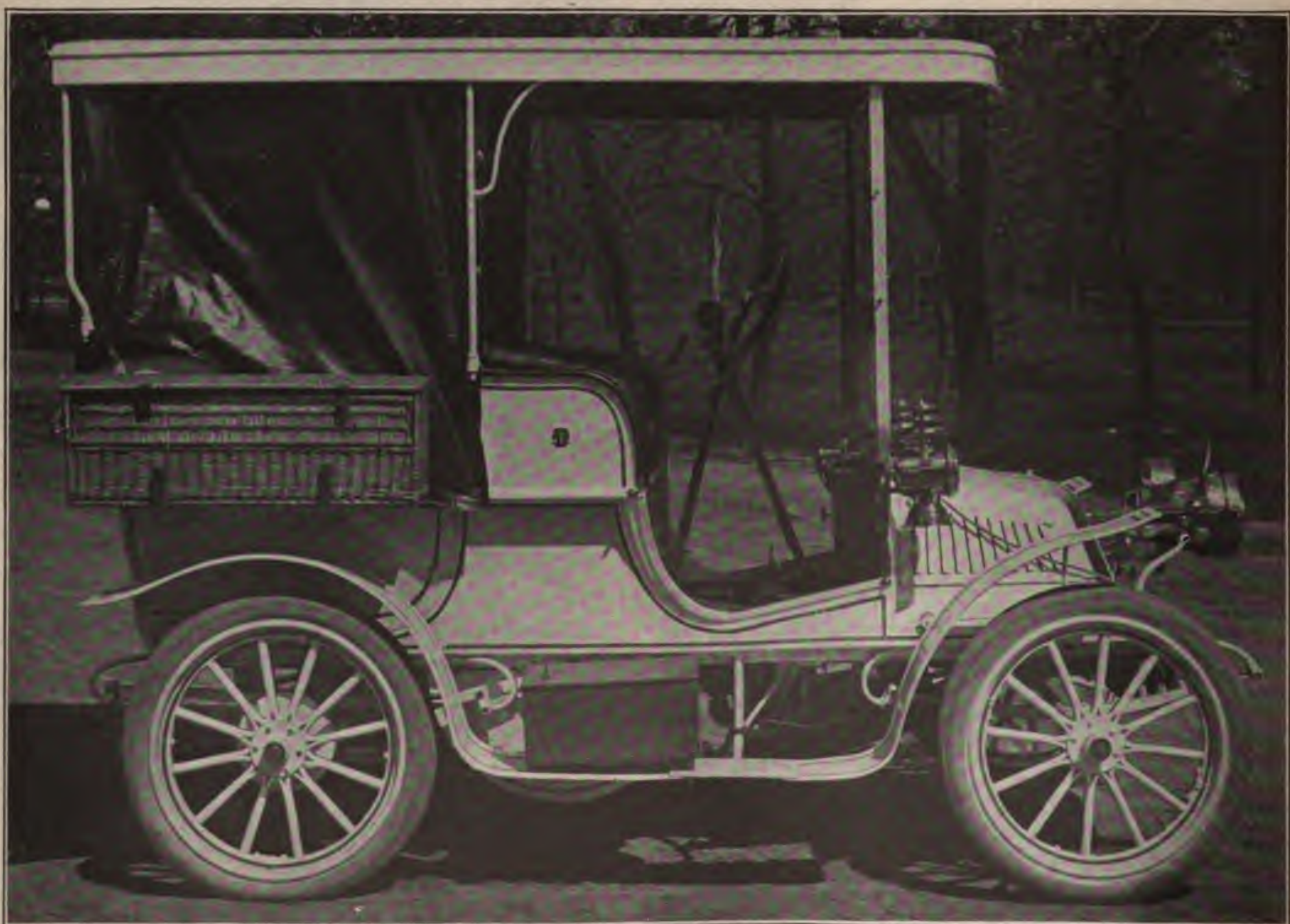
We illustrate herewith a demonstrating car with closed body and glass front, built by the A. L. Dyke Auto Supply Company, of St. Louis. The car comprises Dyke's No. 1 outfit, a flexible reachless angle iron frame running gear, and a single cylinder 5¼x6 horizontal engine, said to develop a little over 7 horse power. The engine is fitted with a brush system of ignition contact breaker and a float feed carburetor. The transmission is of the sun and planet type and is located on an extension of the engine shaft. The crank head extends around the transmission, making the engine and transmission practically a single power unit, which is bolted to the angle iron frame.

The machine has quite a number of new features. The running gear is made up of 2 inch angle iron and drop forged body hanger, and semi-elliptic springs are used in front and rear. A special rear axle bearing brings the spring support near the hub and not too far out on the axle, thus relieving the strain on the latter. The rear axle is of 1 inch solid steel, and the differential gear a Brown-Lipe model No. 3, with a twenty-four tooth sprocket for a roller chain of 1¼ inch pitch and one-half inch diameter of rollers. Timken roller bearings are used both in front and rear, and special stamped steel hubs are used. The steering is by an inclined hand wheel, which can be swung out of the way, and through a worm and wheel sector and an improved type of adjustable knuckle joints.

Both the water and gasoline tanks are placed under the hood of the car. The gasoline tank, in the rear of the hood, holds 5 gallons and is connected to the carburetor by means of a small copper pipe and union. A combined needle valve and strainer is riveted and sweated to the bottom of the tank, and the valve projects to one side beyond the body, which enables the operator to easily open and close it. The float in the carburetor automatically cuts off the oil and an extra drain pipe is connected to the tank. The water tank is made with copper tubes of 1 inch diameter running through it, and the circulation of the water is by thermo-siphon action, doing away with the pump. Mr. Dyke states that in a recent test he ran the machine continuously for six hours and found the thermo-siphon circulation entirely satisfactory. To fill the tanks the lid on top is opened and the water poured in, there being a funnel soldered to the tank. The filler cap is provided with an air vent and when unscrewed cannot be lost, being flexibly connected to the tank.

The engine is hung horizontal by the cylinder coming directly under the footboard and the flywheel under the seat. The entire floor can be taken up in sections, and the panels under the seat removed, thus exposing the entire mechanism. A leather apron extends from underneath the tanks back under the mechanism, which prevents dust getting to it. As the engine parts are all encased and run in oil this is, however, not absolutely necessary.

The rear tonneau can be detached by loosening two thumb screws, and the top can be taken off by loosening six nuts. The front of the top is made in two sections of glass. The lower section remains in place, and the top can be raised or lowered while in motion. An automatic spring catches the front when raised. This window is quite a protection when running against the wind. The curtains extend around the entire machine, and can be closed up entirely if necessary. A tool box is provided on each side, placed on a spring hanger, which prevents the box from jolting and rattling. The fenders extend over the entire radius of the wheel, and are made of sheet iron. The oiling is automatic; when the engine starts the oil begins to flow, and



Dyke's 7 Horse Power Gasoline Car.

:he engine stops the oil stops. This ımplished by a multiple oiler placed dash, one pipe leading to the cylin- d another to the friction device on ınsmission. A one-eighth inch cop- e runs from the bottom of this oiler muffler pipe, and the pressure from uffler keeps the oil in motion. Of a check is provided between muf- d oiler. Sight feeds are provided on the oiler, and the operator can see times if the oil is feeding properly. speeds are controlled by a foot lever :ted with the carburetor, which gen- gives all the variations of speed de- A small brass lever is provided on lescope tubing around the steering onnected with the contact box, and r increase of speed is obtained by g this.

contact box is automatic in adjust- and thoroughly insulated from the :. It consists of two brushes running fibre commutator, making contact at ain time. Springs pressing against rushes keep them against the fibre. ix cell batteries of the small Colum- pe are used. These batteries have ed connections, duplex terminals and r covered wiring. One of the bat- hange and plug switches is used, and itteries can be shifted, one set being d for a while and then the other. switch also has a plug which can be ed, and the engine cannot be started :he plug is inserted. Another feature he upholstering. The seats are made ther, stuffed with horsehair and metal s placed beneath them; this is then at the bottom with leather, and a air vent is provided so that the air s when depressed.

machine is also equipped with a storage battery and Apple dynamo ixiliary use, and for the electric side and tail light. There are also two electric lights in the top of the can- op, which are operated from the stor- battery. This storage battery is re- ed by the dynamo, and the dynamo is eration only when it is desired to e the battery. It is operated by fric- from the flywheel, and is pressed st the flywheel by means of a small ever with a ratchet attachment.

machine shown in illustration is ed white and striped in gold; the and inside of the hood and the radi- are red. The tires on this particular ine are G & J, 30x3½.

A New Autolyte.

H. Funke, 325 Broadway, New York, rought out an acetylene searchlight of size and comparatively low price for nobiles. The generator and lamp are ate and are connected by a rubber The lamp itself, made in the form of dlight, is 7 inches in diameter and has -half foot burner tip. The generator e placed anywhere on the car and is of such capacity that one charge will last seven hours. As an indication of the strength of the light it is stated that it will show telegraph poles on the road 150 feet ahead.

FUNKE'S NEW AUTOLYTE.

A New Spark Plug.

The Seidler-Miner Electric Company, of Detroit, Mich., are manufacturing a plug which is claimed to be self cleaning. The accompanying cut serves to illustrate the principle. The outer shell of the plug forms a chamber which communicates with the cylinder by a small circular passage. The central terminal extends through this passage concentric with the wall thereof, and the space between the central terminal and the wall of the passage forms the spark gap. Owing to the compression in the cylinder and subsequent explosion and expansion there is a continuous flow of gases through the passage into and out of the space in the plug shell, and this cleans the terminals of any soot that may deposit on them and of oil.

Roche's New Spark Plug.

William Roche, 42 Vesey street, New York city, has designed a spark plug without points. The central terminal is provided with a head at the inner end, which comes in proximity to the edge of the steel shell, and the spark gap is of the form of an annular space all around the head. The insulating core consists of porcelain in a single piece, and is packed with asbestos. A coiled spring is placed around the central terminal under the washer at the outer end to prevent the porcelain from cracking when the engine is cooling, owing to the more rapid cooling of the metal than the porcelain. A chamber is formed between the porcelain, outer shell and head, and it is claimed that owing to the passage of gases into and out of this chamber during compression and expansion respectively no soot will deposit around the electrode and short circuit the plug. The plugs are made with three-eighth inch pipe, De Dion metric and one-half inch pipe threads.

SEIDLER-MINER'S SPARK PLUG.

..COMMUNICATIONS..

Remodeling a Touring Car.

Editor HORSELESS AGE:

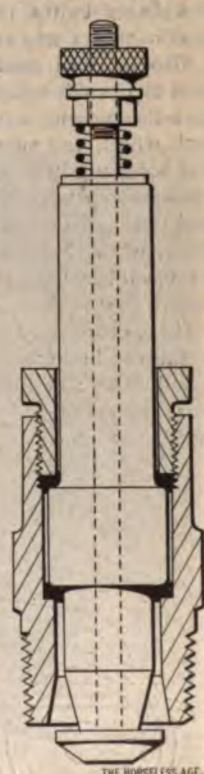
I have recently had occasion to remodel a touring car of a standard make, purchased late last summer, and, having been much aided by the experiences of others in this department of your valuable journal, send you herewith a photograph of the car as remodeled, trusting you will find space to reproduce the same. The changes, in brief, are as follows:

The wheel base has been lengthened 6 inches to full 90 inches; this by inserting steel bars with lugs, to which the front spring system is attached, into the channel iron, and hot riveting the same, and by attaching channel iron to the outer end of the steel bars and running it around the front, thus lengthening the frame about 18 inches, and the body nearly as much.

This work involved changes in the steering gear, in the side reach rods, and in the connections with the cooler, but these were all easily and safely made.

As the result of these changes I have the following improvements:

The frame and the body are much longer, and the car rides over the roughest road with the ease of a four in hand coach. The cooler, front mud guards and acetylene lamps are all attached to the steel frame, and not to the wood body as before. The car has been given a hood effect, which has greatly improved its lines. The front has been divided into two compartments, one directly over the cooler, with a lid opening upward, which has become a commodious tool box; the rear into a chest of the capacity of a small steamer trunk, with one tray, making bas-



ROCHE'S SPARK PLUG.

A Packard Remodeled.

kets almost unnecessary in touring. The whole front is made water tight by a rubber blanket, which may be attached to the dash and carried over the steel frame back of the lamps.

As will be seen, I now have a high dash, a large horn, placed conveniently, lamps much nearer the road level and supplied with acetylene from a large double generator on the dash, and a number of minor improvements, appreciated by those who have taken long tours.

A glance at the photograph would also show other changes to those familiar with this make of car. For instance, mud guards which sweep to the rear and fully protect the body from splashing, and extend also forward to the step, the whole improving the lines of the car; a high back door, with detachable seat, the door when shut being bolted to the rear of the tonneau in such a way as to be absolutely safe. I also inserted steel bars in the channel steel at the sides of the car, put new bushings throughout, new cones and balls for each wheel, and substituted a storage battery for one of the dry batteries. The car has been repainted a dark wine color, running gear fire wagon red, mud guards black, while the exposed parts of the motor have been dressed up with aluminum paint.

These changes have increased the weight of the car but 150 pounds, and have cost, including an additional acetylene lamp with brass generator, and a new horn, less than $400. The speed and power of the motor are the same, and the general exterior effect of the car has been greatly improved.

William H. Hotchkiss.

A Clutchless Gasoline Car.

Editor Horseless Age:

As your readers have noted your opinion of the "hydrocarbon automobile without a clutch" in your issue of April 29 I should be pleased to have their attention called to the accompanying illustration.

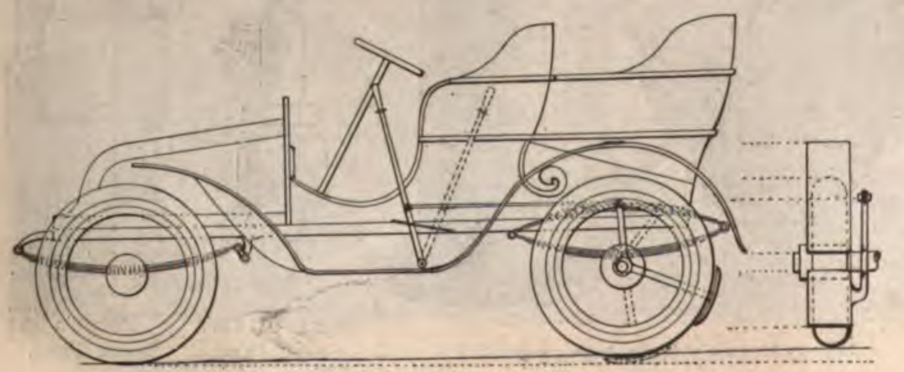
It will be seen that the raised wheel is not let down directly to the road as would be inferred in your article.

With the low speed thrown in starting is very easily effected by simply releasing the lever and pushing to its forward position. Thus gravity and the pressure on the lever start the car.

This device has been very thoroughly tested not only as a car starter but as an emergency brake.

W. C. Smith.

[We give space to this communication as at the present moment anything in the hydrocarbon automobile line that is claimed to get around the Selden patent is of interest to all concerned in the manufacture of this class of vehicles. We fail to see, however, that the design will meet the practical requirements in a car. Even if the car could be started on a very low gear by letting the raised wheel down to the ground it would be a practical impossibility to change from the lower to a higher gear, and vice versa, which must be done while the car is running.—Ed.]



Longer Springs Give Greater Comfort.

Editor Horseless Age:

I have recently secured a 1902 model of a popular style of touring car, the trial trips of which were taken on New York's asphalt covered streets. After I had taken the machine from the cars I speeded it over the roads around here, and I soon found that the springs were not adapted for real touring, because they were so short and stiff that the passengers were tossed about almost like pop corn when it is just opening up. I used the carriage a number of times, and each trip was a hardship. Finally I concluded that if I could not remedy the trouble I should sell the machine, even though it was all right in every other way.

I bought a set of springs similar to the ones used on the 1903 model, and a pair of spring arms for the front. It took a machinist a full week to make the change, because there were many slight alterations. When finally completed I found that the front axle had been set forward 8 inches, and the rear was moved up front 2 inches. I had intended to have the rear axle set back, but I found that the work would take a long time, as it involved either having special castings made or lengthening the frame and body. Altogether there was an increase of 6 inches in the wheel base, together with new springs that were 6 inches longer than the old ones. The result was that the body was 3 inches higher from the ground than before, and the appearance of the carriage rather more imposing.

It was midnight Saturday when the job was completed enough to run the carriage, and I pushed out into the darkness. I ran at full speed'something over 10 miles an hour. I purposely selected all the rough spots I knew of, where I had previously been obliged to travel at a 4 mile an hour gait, and I was agreeably surprised to find that I remained on the seat through all the wild dashes. Of course I could feel the hollows and street crossings, but there was nothing disagreeable even at high speed. At moderate speed I ran over all the rough spots so lightly that they were hardly perceived. On level roads the carriage ran almost as though it was flying through the air. I managed to pick up two young men, and the one who was in the tonneau said that he did not feel any jar when going over bad street crossings. Before putting on the springs the tonneau passengers used to hang on to a big brass rail fastened to the back of the front seat, and they had a mighty uncomfortable time when the roads were in bad shape. Now my guests can sit back and act as though they were really enjoying the experience, no matter what the speed is.

I have been bothered because the engine did not readily answer to the controlling valve, as there seemed a leak in the air system. I took apart the rear carburetor, and found that the inlet valve had worn

the brass bushing through which it passes, so that the joint was loose. I had a new bushing made, with a good fit, and found that the annoying fault quickly disappeared.

The other day a friend asked me to go and look at a carriage he proposed to buy—a new machine costing close to $2,000. He said it was recommended by the builders as being just as good as a $3,000 automobile. Well, I inspected the marvel. I found it to be an entirely new carriage, very showy in appearance, with real Frenchy lines, which, of course, included numerous brass rails. The engine was located under the seat, with no panels or any other way to reach it, except by removing the body. The crank case was sealed up, and it was crossed by a dozen oil pipes, so that it would be a day's job to get at the cranks. The front seat was divided, and there was a tonneau. The latter was so small that grown people would have to double up in uncomfortable attitudes to occupy the little shelves set in as seats. The upholstering was of gaudy colored leather, already tarnished, and the stuffing seemed to be rocks. The backs were low and set at an uncomfortable angle. Then the steering gear had worked loose in the few trials given the machine. Altogether the carriage was about the worst I had ever seen for practical use, and yet it looked like a sporty rig. That was apparently what the designer aimed at. I imagine a good many similar carriages will be sold this season, and the new owners will certainly know what trouble means. ROBIN DAMON.

Clarkson's Ltd., of Chelmsford, Endland, inform us that they built the radiator for the Napier Gordon Bennett cup defenders, and also the radiator for the original Gordon Bennett cup winner, which was made up at twenty-four hours' notice.

Auxiliary Spark Gap at Plug Connection—Treatment of Limy Boiler Water.

AMHERST, Mass., May 7.

Editor HORSELESS AGE:

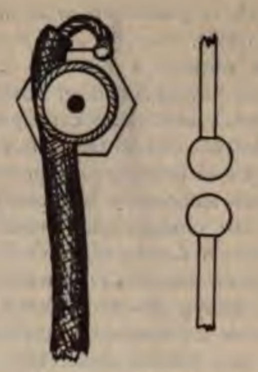
I should like to make several suggestions which may prove useful to your readers.

I find a very simple and yet effective form of auxiliary spark gap to be that shown in Fig. 1. The insulation of the secondary wire is clamped into the binding post of the spark plug, and the wire bent until the proper gap is obtained. A drop of solder, applied to the end of the wire, improves the device.

A very common mistake at present seems to be that of making either one or both of the discharge terminals pointed. This construction partially defeats the purpose for which the auxiliary gap is made. The terminals should be made as in Fig. 2.

The Toepler Holtz machine affords a convenient means of studying static discharges. The spark terminals of this machine are made as shown in Fig. 2. The discharge between the balls is large and takes place suddenly, being accompanied by a loud report. When one of the balls is removed, however, and a point substituted, the electricity moves across the gap in the form of a steady, almost invisible, silent discharge. Exactly the same results, on a smaller scale, are obtained in the auxiliary spark gap. The spark should be brilliant and sudden to enable it to be seen and felt.

I have read several accounts of persons having trouble with steam machines on account of hard water. Ordinary limestone, or calcium carbonate, $CaCO_3$, is not soluble in pure water, but dissolves in water containing carbonic acid gas, CO_2. The calcium carbonate combines with the carbonic acid, forming acid calcium carbon-



FIGS. 1 AND 2.

ate, $H_2Ca\ (CO_3)_2$, and this is the substance that dissolves in the water. When water is boiled the carbonic acid gas is driven off, and the calcium carbonate, being insoluble, is precipitated on the interior of the boiler in the form of boiler cake. Where soft water is not available this calcium carbonate should be precipitated before the water is placed in the boiler. This is easily accomplished as follows: The water to be used is placed in convenient barrels or tanks, and enough lime is added to form the precipitate. The action is as follows:

$$CaO + H_2Ca\ (CO_3)_2 = 2CaCO_3 + H_2O.$$

The lime water, which is a base, acts upon the acid calcium carbonate, giving the white calcium carbonate (which settles to the bottom) and pure water. When the $CaCO_3$ has settled the water is tapped off and the tank cleaned. L. E. FRENCH.

A Situation Favorable to Steam.

Editor HORSELESS AGE:

I am sending with this letter a photograph of my automobile, taken while I was running it in California during the flood this spring. I was going unconcernedly along when a photographer hailed me and wanted me to stop long enough for him to

IN A CALIFORNIA FLOOD.

"snap" me. I pulled up, with the accompanying result.

I have noticed a number of pictures which you have printed of various automobile users and their carriages, and it strikes me that this situation is sufficiently novel to be of interest to your readers. I myself was sufficiently interested to have some of the photographs struck off after they had been developed.

Mine was the only machine out at Stockton during this flood, and I have had considerable amusement at the expense of my gasoline friends about their keeping "dark" at any time; and have wondered to myself how many short circuits to the square inch a gasoline car would have developed under similar circumstances?

I have been very much interested in the discussions which have been growing up in more than one of the auto. journals concerning the relative merits of steam and gasoline cars; but for my own part I am a stanch advocate of steam. I may be somewhat prejudiced, but the semi-flash boiler in my carriage generates steam almost instantly, and it will not only not explode nor burn out, but I have no water glass to watch, and am consequently relieved of those inconveniences and annoyances which too often attend the ordinary steam vehicle. LEO T. SALBACH.

Position of Gasoline Tank on Explosive Engine Cars.

Editor HORSELESS AGE:

I have read with much interest H. B. H.'s account of his experiences with an air cooled car in your issues of April 29 and May 6. As he says in his last letter that he has been in the habit of opening the relief valve while the engine is still exploding, and has written to the manufacturers asking for information as to whether this practice is safe or not, I hasten to say that I know of my own knowledge that it is not at all safe, the reason being that the compression relief in this car is obtained, not by partly opening the exhaust valve, as was the case in H. B. H's fourth car, nor by opening a pet cock as is sometimes done, but by opening the inlet valve, which is only a few inches distant from the point at which the fluid gasoline enters the vaporizing device, and this point again is only a few inches removed from the gasoline tank holding some 8 or 10 gallons.

The danger of this arrangement was vividly impressed upon me by a recent occurrence in the station at which I keep my machine. A car of the same make as his (1902 model) was being got ready to start, and six or seven persons, owners of other carriages and their guests, were waiting for this machine to go out and leave the passage clear. The proprietor of the station was on one side of the machine trying to start it. He failed to do so after several attempts (owing I believe to a defective exhaust valve), and in the course of his attempts he had several times opened the priming valve, with the result that quite a little gasoline had got into the vaporizing tube or pipe. Happening to have the compression relief valve open at the time, when a spark passed in the cylinder, the flame traveled into the vaporizing pipe, and instantly there was a blaze.

By the prompt use of a hose and chemical fire extinguishers the blaze was put out without any serious harm being done, much to the relief of some of us who knew that a tank holding about 8 gallons was lapped by the flames.

I may add that I am familiar with this make of car, and an automobilist of ability and experience who owned one told me that in his opinion it was about the most reliable single cylinder car on the market, provided that the throttle is not opened too wide on level roads. Possibly H. B. H. may favor us with another letter after he has run his car six months.

The same man who was starting the engine in this case had a similar experience, which resulted in the destruction of the body of the car of a machine of the same make as H. B. H.'s fourth car.

He was running the machine quite rapidly after dark, having a friend with him, and upon noticing a reflection of light from the trees he turned and found the rear of his machine in a blaze, which he was unable to put out without the aid of a fire engine.

The cause of the first of these fires was apparent upon examination of the machine. That of the second, however, is still a mystery, no hypothesis which has been advanced squaring with the facts of the case.

I sold two steam machines chiefly because I was unwilling to longer run the risk of the breaking of a pipe containing gasoline under pressure, but these two recent experiences have suggested to me that even with a hydrocarbon engine the practice of storing gasoline in the same compartment with an explosive motor and close to it is not safe and should not be permitted by law. In fact, if the Legislature should turn its attention to making adequate provision for a sufficient number of brakes on machines and adequate safeguards against unauthorized starting, proper regulations for the position of gasoline tanks, the use of muffler cut-offs, maximum engine power and similar matters, the public interests would be better protected than by the enactment of laws such as the Doughty bill, which in effect harasses all automobilists as a punishment for the excesses of a few. VIATOR.

Motor Cyclists Forming National Organization.

Editor HORSELESS AGE:

Will you please state for the benefit of L. E. French, whose communication favoring a national organization of motor cyclists appears in your issue of April 29, and for the information of all others who may be interested, that the New York Motor Cycle Club already has the matter in hand, and has empowered a committee, of which the undersigned is chairman, to select a date and place and issue a call for a meeting for the very purpose Mr. French suggests. If he or any other motor cyclist will forward his name and address to me at P. O. Box 649, this city, I will see to it that he is kept posted, and receives an invitation when the details are perfected. We are naturally anxious to get in touch with as many motor cyclists as is possible.

R. G. BETTS.

Results of Boston Hill Climbing Contest—A Correction.

Editor HORSELESS AGE:

We noted in your issue of April 29 a report of the Massachusetts Automobile Club hill climbing contest, wherein O. B. Cole's Duryea was credited with very slow time. This vehicle made the climb in 40 3-5 seconds, and the minute added was an error. The referee has awarded the cup for the gasoline class, under 2,000 pounds, to Mr. O. B. Cole, who drove a Duryea phæton. Mr. A. T. Harris, also driving a Duryea, goes to third position instead of second.

DURYEA POWER COMPANY,
C. E. Duryea.

The English Gordon Bennett Eliminating Trials.

LONDON, W., April 30.

Editor HORSELESS AGE:

I would like to draw your attention to the result of the Gordon Bennett eliminating tests and to point out that the cars used were of far too small a horse power to do their best for the trials selected. For the speed trials the horse power was of course totally inadequate and the vehicles not suitable for such a trial; the whole merit of the cars is their extraordinary handiness and the speed at which they can be stopped or slowed at a corner, and also the speed at which they will go round a corner, owing to the bulk of the weight being so close to the ground and a much larger proportion on the back wheels than is usual in racing motor carriages.

For the hill climb the cars were at a very serious disadvantage, as they are built with a direct drive on the top speed to give the greatest possible efficiency when racing; but to do this, efficiency has to be sacrificed on the first and second speeds, and these two speeds only could be used for the hill climb, as there was not sufficient run at the bottom of the hill to enable the top speed to be used. I think it only right that these points should be very carefully noted, as these cars were built for the purpose of racing on Irish roads, and although we were fortunate enough to succeed in the competitions, I cannot help wishing to make it clearly known that the competitions did not suit the Napier cars built for the Gordon Bennett Race—and that they won despite the handicap. S. F. EDGE.

LEGISLATIVE AND LEGAL.

The Public Hearing on the Doughty-Bailey Bill.

For three hours last Wednesday Governor Odell listened to arguments for and against the Doughty-Bailey automobile bill, which is now in his hands for approval. About seventy-five interested persons were present. Those who protested against the measure were represented by able counsel and fought well, while the supporters of the measure were as well represented by Congressman I. Townsend Scudder. A great deal of light was thrown on the whole question, and after it was all over the advocates of the bill expressed confidence in the outcome, and a majority of the opponents seemed doubtful of the success of their efforts.

The manufacturers were represented by De Lancey Nicoll, Abraham Gruber and Thaddeus Terry. Capriao Andrade, of the New York Trade Association; Isaac Potter, of the American Motor League; Percy Owen, Dr. Lee H. Smith, Senator Henry Hill, John Shatterfield and Herbert Smith appeared for automobile organizations in every part of the State, and about fifty other individuals lent their moral support.

Associated with Mr. Scudder were Senator Bailey, former Senator Cocks and J. L. Brower, president of the West End Improvement Association, of New York.

Mr. Nicoll opened for the protestants by stating that there are now invested in the automobile industry $100,000,000, that it gives employment to 150,000 men, 10,000 of them in New York State, and that the output of the industry this year will amount to $26,000,000. He continued: "If this bill becomes a law the market this State affords now—and it is enormous—will be practically taken away from the trade, which would be a serious blow, and, in fact, would ruin the business. The effect would be still more disastrous when other States enacted similar legislation, as they frequently copy our laws. The bald question that must be answered is, Will this State kill the automobile industry? That this state of affairs will be brought about no one can doubt, because no man could feel that he could run an automobile and keep out of jail. Will people buy machines when that condition confronts them? Aside from the clause that demands imprisonment what would be the pleasure of automobiling when it could be made impossible for anyone to ride faster than 8 miles an hour in any section of the country, whether built up or not? A horse can be driven faster. All the hamlets in the State are given power to pass such ordinances as they think fit, and any man that violates any of these is first to be fined, and on the third offense his license is to be revoked, and he is to be deprived of the use of his car. This is outrageous, because, in the first place, it makes it mandatory that the judge send an offender to jail, and then because it directs a confiscation of property that is tyrannical and heretofore unheard of. The laws already on our statute books give ample protection to all, and would only be complicated by adding this one. Aside from the many rules and ordinances that towns can enact, making it impossible for an automobilist to operate a car and keep out of jail, there are in this measure itself just twenty-one provisions, the violation of any one of which is punishable by fines the first and second time, and then by imprisonment; and most of these offenses are trivial. Then take the provision for the issuance of licenses. If one does not take out a license in thirty days he cannot get one, as the Secretary of State has no right under the law to grant one after that time. Suppose a man is in Europe and comes back after the thirty days are over. He cannot get a license then, and he is forbidden to use his automobile in the State. In conclusion I will say that the bill aims a blow at a class who wish to respect the law."

Senator Henry Hill expressed the opinion that the Cocks law was sufficient, and that it afforded ample protection, and said: "Under this act no local body can regulate the speed of automobiles at less than 15 miles where the houses are more than 100 feet apart. Now, in Buffalo, on Delaware avenue, the houses are more than 100 feet part, and the people are powerless to protect themselves under this act. Thus this law takes away our home rule, and for that reason, if for no other, it should be vetoed."

Col. Abraham Gruber read and dwelt upon the resolution adopted by the Automobile Club of America, in which the members put themselves on record as opposed to the measure, and explained that no protest was made during the passage of the bill, because President Shattuck and the law committee of the club had led those interested to believe that the law was a good one, and they took their word for it. He pleaded for the same consideration for the automobile business as is accorded the dry goods business or the carriage business, and said that the new trade should not be singled out for oppressive legislation. He attacked President Shattuck for supporting the bill on the ground that his chief interest was in a speedway on Long Island. He showed that if an automobilist passes any kind of a domestic animal, and this included everything from a horse to a cat, at a speed greater than 8 miles, he would be arrested, and if he did such a thing the third time he would have to go to jail, as no fine could be imposed for a third offense, and the court had no discretion. "Thus the courts," he concluded, "are robbed of discretion, something that lawmakers have heretofore hesitated to do. The whole measure is extreme, and cannot be enforced. The more you crowd the statute books with such laws the greater premium you place on violation."

Thaddeus Terry said that the automobile manufacturers did not want any mercy shown careless drivers, but that it looked very much as if the law was the result of prejudice, such as the bicycle business had to contend with years ago.

John Shatterfield said that he had had experience here and abroad, and that the law was the most drastic, and would injure the business and the pleasure of automobiling more than any he had ever heard of. "In France, the cradle of the automobile," he added, "one is given the right to use judgment, and to ride as long as he preserves reason, and the Government does all in its power to advance the business, whereas this law will discourage the use of automobiles, and unless it is vetoed will work great injury in many ways."

Congressman Scudder said: "The law that has been expounded here does not add to the reputations of the members of the bar who have appeared. None of these provisions, if unintentionally violated, will place any man in jail, as has been claimed. But where they are violated intentionally the guilty one will be put in jail, and that is where he ought to be. The present laws are not good. In fact they are gold bricks. We have had much experience with them on Long Island. A private subscription of $1,000 a month was spent to prosecute violators, and we had forty-two convictions. This bill provides for 8 miles in cities and towns, 15 miles in thinly settled sections and 20 miles in the open country. That seems to me to be fair enough. No better conditions are offered anywhere. Why are these persons opposed to it? If they will not go faster than that under the present law why do they fear this law? Why have they cars capable of 80 miles an hour if they care to go only 20 miles? This looks suspicious. The law is framed to protect the people who must travel in more humble fashion than in automobiles, and it seems to me that these people should receive some consideration. There will be no more timing traps and spies, as posts must be erected in the restricted districts. The man who will violate such a law as this should be in jail, notwithstanding the horror with which such a thing is painted by the opposition. It is not true that the courts are allowed no discretion. Any man arrested has the right of trial by jury, but it has been my experience that they don't care for jury trials. The present laws are incapable of enforcement. When an arrest is made a civil suit must be begun to recover a fine of $25, and the money is paid as an incidental expense of the day's sport. Why did not this opposition come up when the bill was in the Legislature? We would have listened to suggestions and made a compromise if possible, but instead the opposition waited to put the whole burden on the Governor. I think the talk about injury to the trade is empty. Law abiding people who like automobiling will

son and to arrange several runs. Asa Goddard was elected president; Dr. Roy M. Garfield, vice president; Harry E. Shiland, secretary; John W. Harrington, treasurer. Board of Governors—Dr. Roy M. Garfield, chairman; B. A. Robinson, Asa Goddard, George B. Cutting, Harry E. Shiland and John P. Coughlin. J. P. Kilgore, chief marshal. Suitable clubrooms will be engaged by the board of governors, who will also decide upon a suitable date for a banquet in the near future. The membership was increased by four, and there are many applications awaiting action. The club expects to increase the membership at least 50 per cent.

A. C. OF PHILADELPHIA.

The committee on legislation of the Automobile Club of Philadelphia has sent out pamphlets to every automobilist in Pennsylvania explaining the additional rights secured for owners of automobiles by the new law recently signed by Governor Pennypacker. As originally introduced in the House, the bill provided for the filing of a bond of $1,000 for the possession of automobiles by non-residents, a fine of $100, imprisonment for thirty days, etc.

SYRACUSE A. C.

George S. Larrabee, chairman of the good roads committee of the Automobile Club of Syracuse, N. Y., and Henry Walters, the club's attorney, will take active steps to secure the improvement in the toll roads of Onondago County. The roads of which the automobilists most complain are those leading to Fayetteville and beyond and to Liverpool. Last week Chairman Larrabee, Mr. Walters, H. W. Smith, president of the New York State Association of Automobile Clubs; M. C. Blackman and Frederick H. Elliott made a trip over the roads in question, and found that the beds in many places were sadly in need of rebuilding.

PATERSON A. C.

The Paterson (N. J.) Automobile Club gave a banquet to its members and five invited guests at the North Jersey County Club on April 27. Ex-Judge Frank Van Cleve presided at the post prandial exercises, and impromptu speeches on automobile topics were made by Judge Francis Scott, Senator Wood McKee, Mayor John Hinchliffe, Congressman William Hughes and Henry C. Allen.

CHICAGO A. C.

Circular letters have been sent out by A. C. Banker, chairman of a special committee, inquiring as to the possibilities of having an endurance contest from New York to Chicago next summer or fall and whether the authorities of cities or counties along the route would be likely to grant permission for the race to pass through, provided it is scheduled to run not faster than 20 miles an hour in the country and 8 miles in towns. The intention is to start the contest early on Monday morning and schedule a eleven hour drive each day at an average speed of 20 miles an hour, or about 200 miles a day, reaching Chicago some time on the following Saturday.

COLORADO A. C.

At a recent meeting it was decided to hold on May 30 a 100 mile automobile endurance contest on a course from Denver to Palmer Lake and return. It will be in charge of the following committee, which has drawn up a set of rules: Bryan Haywood, E. H. Hurlburt and M. J. Patterson. The time for receiving entries will close on May 25.

A. C. A. Commercial Vehicle Contest

The efforts of the Automobile Club of America in the direction of a commercial vehicle contest to be held in New York city on May 20 and 21 are now beginning to bear fruit. There are already nine entries in hand and it is expected that at least sixty cars will be in line. All those who have already made entries have sent photographs showing a great variety of cars. Those so far entered are the Motor Truck Company, of Columbus, Ohio (gasoline), Morgan Motor Company (steam), Empire State Engineering Company (steam), International Motor Car Company (electric), Union Motor Truck Company (gasoline), Coulthard Steam Wagon Company, of England, the Adams Express Company (steam), Grout Brothers (steam), Knox Automobile Company (gasoline), and the Motor Truck Company (gasoline).

None of the large New York houses which use automobiles have made entry, nor have they indicated their intentions in the matter. It was said at the club that unless some interest was manifested by them soon a committee would be appointed to visit them.

A. A. A. Affairs.

New racing rules were considered by the racing board on May 6.

N. A. A. M. Matters.

A meeting of the executive committee was held May 5. Only two members were absent.

The Bailey bill was discussed at some length and the following resolution was adopted:

"That in view of the general impression that the National Association of Automobile Manufacturers was represented at Albany by the Automobile Club of America we desire it put on our records that this association was not represented by anyone, nor was it consulted in any way in connection with the Doughty-Bailey bill before the same was passed." It was decided that President M. J. Budlong, Vice President Charles Clifton, and Treasurer Percy Owen, together with counsel, should represent the association at the hearing on the Bailey bill matter before Governor Odell on May 6.

The Pope Manufacturing Company was elected to active membership and the Official Automobile Blue Book to associate membership.

There was some discussion regarding the proposed moving exhibit of automobiles at the St. Louis Exposition, and it was decided that members be asked whether or not they favor the plan for maintaining machines at the World's Fair for demonstration in the Stadium and Exposition grounds before a definite conclusion is reached by the association.

The resignation of F. S. Fish, of the Studebaker Brothers Manufacturing Company, as a member of the executive committee was accepted. Will R. Innis, the company's New York representative, was elected to the vacancy.

The technical committee was instructed to submit suggestions regarding the holding of automobile contests during the coming summer or fall.

N. Y. A. T. A

The New York Automobile Trade Association held a meeting last Friday night and elected four new members, making in all twenty-nine members. Those who were taken in were the Automobile Exchange and Storage Company, Franco-American Automobile Company, Smith & Martenson and the Harlem Automobile Company.

Secretary Plummer was instructed to write to William C. Whitney thanking him for his efforts in behalf of the association in the fight on the Doughty-Bailey bill. Mr. Whitney gave the delegates of the association the use of his personal card to the Governor.

Chairman Andrade, of a committee to look into the best way to supply bail for members who are arrested, reported that he had looked into the matter of having a continuous bond in the hands of the authorities, but that he found it was not feasible. He reported, however, that he had received a proposition from a private source of a bondsman who would furnish bail at any time for a year provided he could get 500 subscribers to a fund at $10 a year each. The matter will be taken up at the next meeting and a plan arranged whereby the offer may be accepted.

Trade Literature Received.

High Class "Chelmsford" Steam Cars.—Clarkson, Ltd., Moulsham Works, Chelmsford, England.

Autolyte No. 22.—A. H. Funke, 325 Broadway, New York city.

"The 1903 Model Touring Car."—Model Gas Engine Company, of Auburn, Ind.

"High Class Hydro-Carbon Motors, Transmission Gears, Accessories and Parts for Automobile and Marine."—Motor Car Power Equipment Company, 255 Lake street, Milwaukee, Wis.

"Circular No. 2."—Motor Car Power Equipment Company, of 255 Lake street, Milwaukee, Wis.

Automobiles, Motors, Carburetors, Spark Plugs.—National Automobile and Motor Company, Milwaukee, Wis.

...OUR...)REIGN EXCHANGES

Front or Rear Drive.

: above subject is discussed as follows recent issue of *Automobil Welt*, by R. enke, who states that he has built the same number of vehicles with methods of driving:

: fact that the writer applied front ig only in electric vehicles, and there in wagons for heavy loads, indicates lifficulties in design with front driving ive rear driving a practical advantage : majority of cases, until a more add stage of mechanical design shall been reached. The wagons with front weighing between 4,400 and 6,600 ls without load, were peculiar for their parably responsive steering, resulting the use of a pivoted fore carriage ted on ball bearings and a one piece axle. With this construction the vemay be started on a curve with a ra-equal to the wheel base.

ias been found that with front driven les rubber tires are only required on ont wheels for driving on snow cov-pavement, while with rear driving r tires are required both in front and as cross bars and ridges must be cond impractical for city use, and withhem the front wheels constantly take : gutter. On slippery pavement front 1 vehicles run somewhat more steadan rear driven vehicles. If the drivotors or mechanism are permanently ected to the front wheels, so that the motors are shut down their mecal resistance against the direction of on must be overcome by power from heels, the brakes must be lightly apto the rear wheels immediately upon ng down the motors; otherwise, on a ry pavement, the front wheels are not iently retarded and the rear wheels in the direction in which an inclinaof the road bed offers the least rece. This defect, often observed with ectric wagons, depends upon the high ad resistance of electric motors, and e reduced to one-tenth in a suitably ied gasoline vehicle.

regards power consumption, the writspite of the use of highly developed ical measuring instruments and accucomparative calculations, based on cal laws, has not been able to discover erence between front and rear drivlthough many, and especially men of cal experience, maintain that in this ct front driving has the advantage. es, in the case of straight ahead mohis conclusion is undoubtedly in harwith the logic of physical laws.

m a practical standpoint, however, a advantage of front driving over rear g has been demonstrated already with ic drive. Motor and driving gear n much cleaner and free from dust when arranged in front, partly because the mud, etc., thrown by the front wheels is projected on parts back of these wheels and partly because the greater air draft in front cleans the parts located there.

In electric vehicles a higher efficiency of the motors with front driving, owing to the greater cooling effect in front, is to be considered. Peculiarities of design may render the advantage of better cooling nil in the case of gasoline vehicles, although a better cooling effect on the transmission gear with front driving might be of value in preventing the gear from running hot.

The fact that with front driving rubber tires on the front wheels only are sufficient for driving both summer and winter, and that steel tires on the rear wheels are less favorable to skidding than rubber tires, gives front driving a considerable advantage for commercial vehicles for speeds up to 20 miles per hour, particularly owing to the high cost of rubber tires.

The Gordon Bennett Cup Race.

As hinted by Mr. Edge in another column of this issue, the three Napier cars which competed in the eliminating trials at Welbeck are not the ones which will compete in the race in Ireland on July 2. After taking one of the machines over to Ireland and trying it on the course Mr. Edge came to the conclusion that much greater horse power was needed and that the machines ought to be heavier, and in consequence three new machines have just been put in hand at the Napier factory which will be the most powerful of any machines in the race, it is claimed, and have a greater development than even the 90 horse power Mercedes. In case the Automobile Club of Great Britain should object to Mr. Stocks using one of these new machines, only two Napiers will be run.

Some complaint has been raised by the Star Engineering Company that in the eliminating trials three Napiers were pitted against one Star, which they considered rather unfair to them, as only one contestant was to be selected. But it is stated that there was nothing contrary to the conditions of the trials in this, and the conditions were known long beforehand.

The latest news with regard to the possible abstention of the Mercedes Company, owing to its differences with the German Automobile Club regarding the drivers of the competing cars, is to the effect that two of the drivers are satisfactory to the club, but they object to Werner. The rules of the Gordon Bennett race require that the drivers must be members of the club they represent. Now, the German Automobile Club, it appears, admits to membership only "Herrenfahrer," which is generally translated as amateur drivers, and they maintain that Werner is a mere mechanic and cannot therefore aspire to membership. A meeting of the executive board of the club was held on Saturday last to consider a possible change in the rules relating to membership so as to admit technical men. The meeting was attended by the president, Count von Ratibor, Count Sierstorpff, Count Talleyrand-Perigord and others, and it was decided not to "lower the standard of membership," as it would threaten the existence of the club. Candidates for membership must have a social standing. It seems, therefore, that Werner will not drive in the race.

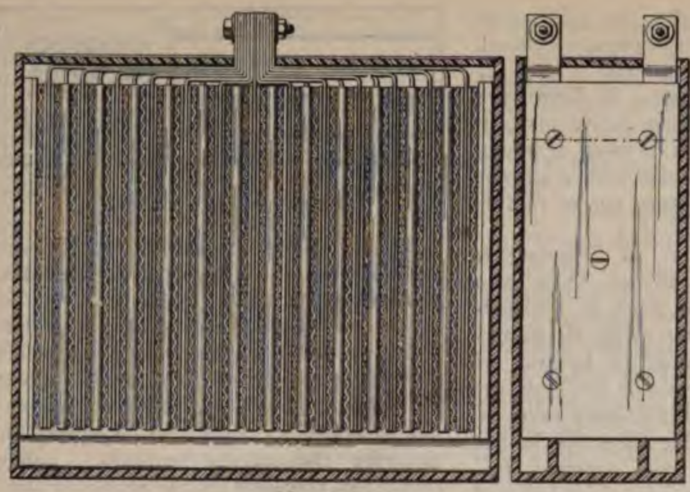
The Paris-Madrid Race.

A long list of prizes in connection with the Paris-Madrid race has been transmitted to the A. C. F. by the Spanish Club, and they include:

1. A prize from the King of Spain for the first car of any class whatever winning the race.
2. A prize from the Prince and Princess des Asturias for the first car which crosses the Spanish frontier, irrespective of any classification.
3. A prize from the Infanta Isabel for the second car which reaches Madrid after classification.
4. From the Minister of Agriculture for the first car using alcohol as a fuel and arriving at Madrid, after classification.
5. A prize from the municipality of Madrid for the first car that shall arrive in Madrid without any reference to classification
6. A prize from the A. C. R. E., for the first car of the first category, which shall arrive in Madrid after classification.
7. A prize from the Ladies' Society of Madrid for the first car of the second category arriving in Madrid after classification.
8. A prize from the Grand Pegna Club for the first car of the third category arriving in Madrid after classification.
9. A prize from the Casino of Madrid for the winning set of cars after classification.
10. A prize from the Nuevo Club for the first car of the fourth category after classification.

In addition to this, the towns of Burgos and San Sebastian are giving prizes for the first car which will arrive within their precincts. And this is only the Spanish side of the prize list. The French side will be even greater still, so that cars that are well placed in the race will have nothing to complain of. In the course of the Paris-Madrid race there will be, acording to the calculations of the *Auto*, upward of 5,000 cyclists engaged in piloting and guiding the competitors, and in assisting generally in the organization and carrying out of the race. From Paris to Bordeaux there will be upward of 38 kilometres of neutralized ground, and three and one-half hours of neutralized time. The cars will have to pass over fifteen level crossings.

Particulars of the new French racers entered for Paris-Madrid are now leaking out. Mors is putting the finishing touches to eight 80 horse power cars. The engines have four cylinders, while a



No. 726,272.

The metal employed in the novel battery consists of extremely thin sheets of lead, .004 to .01 of an inch in thickness, arranged between portions of a very thin tissue or porous fabric, which is impregnated with the active material, the plates thus produced being assembled with very thin separators, arranged between the fabric covered plates and then securely united by fastening means, and then placed in the usual hard rubber cell or receptacle now in use with storage batteries employed with electric vehicles.

with a ten hours' discharge .53 ounce of PbO_2 or peroxide of lead and the same weight of spongy lead are consumed per ampere hour; with a rate of discharge equal to five hours the consumption is equal to .62 ounce; with a rate of discharge equal to three hours the consumption is equal to .70 ounce, and for a rate of discharge equal to one hour the consumption is equal to one ounce, all of which goes to prove that the greater the work required the more rapid will be the deterioration of the battery plates and the heavier the plates must necessarily be. The immediate cause of all this is the considerable thickness of the lead plates employed, the greater portion of the interior of each plate being inaccessible, and therefore unaffected by the electrolyte, this portion of each plate thus remaining inert and dormant, and hence the low efficiency and short life of a storage battery when used under heavy charges. The electrolytic action takes place only to a depth of about 1-32d of an inch, and in order to allow of rapid discharges without serious loss of capacity, the thickness of the metal electrodes or plates has to be reduced to a minimum.

Each plate consists of a single continuous sheet of metal of very thin sheet lead, about .004 to .01 of an inch in thickness and provided with a contact strip. Since it is an utter impossibility to provide such extremely thin plates with an active material, a suitable porous fabric, such as parchment, paper, linen, felt or asbestos fabric, is provided with the active materials, either by impregnation or painting. In practice the tissue is cut of about twice the surface areas of the two opposite sides of each plate, and then one of these large surfaces of tissue is provided by painting thereon with the proper active materials and the same allowed to penetrate the tissue to a depth of about 1-64th of an inch. Each piece of fabric is then placed with its surface which has thus been treated against the opposite sides of the plates by folding the piece of fabric about one of the vertical marginal edges or about the lower marginal edge of the plate.

The active material with which the fabric surrounding the positive is filled consists of red lead or triplumbic tetroxide (Pb_3O_4), and the active material with which the fabric surrounding the negative electrode is provided is litharge, or the monoxide of lead (PbO).

After the respective lead plates have been thus covered each fabric covered plat is pressed out and ironed flat, and is then placed beneath the needle of an ordinary sewing machine, and the fabric and lead plate sewed together with closely placed stitches. Each completed plate is then dipped in a solution of sulphuric acid and water (about one of sulphuric acid to two of water), and then cleansed in clear water, whereupon each plate is again dipped in a bath of ammonia diluted with water, the purpose being to render the fabric and the threads with which the fabric is attached to the metal plate non-attackable to any action of the acid solution of the battery.

Between adjacent electrodes is arranged a separator of interwoven strands of cane.

726,274. Secondary Battery.—Pietro Figuccia, of Boston, Mass. April 28, 1903. Filed May 22, 1902.

The invention refers to the form of the grid, which comprises head and foot members and a series of laterally separated, channeled supports for the active material, which are connected at their ends with the head and foot members. Each support has a plurality of channels separated from each other, and located at the outer faces of the grid to maintain the masses of active material separated, with open spaces between each contiguous pair of supports.

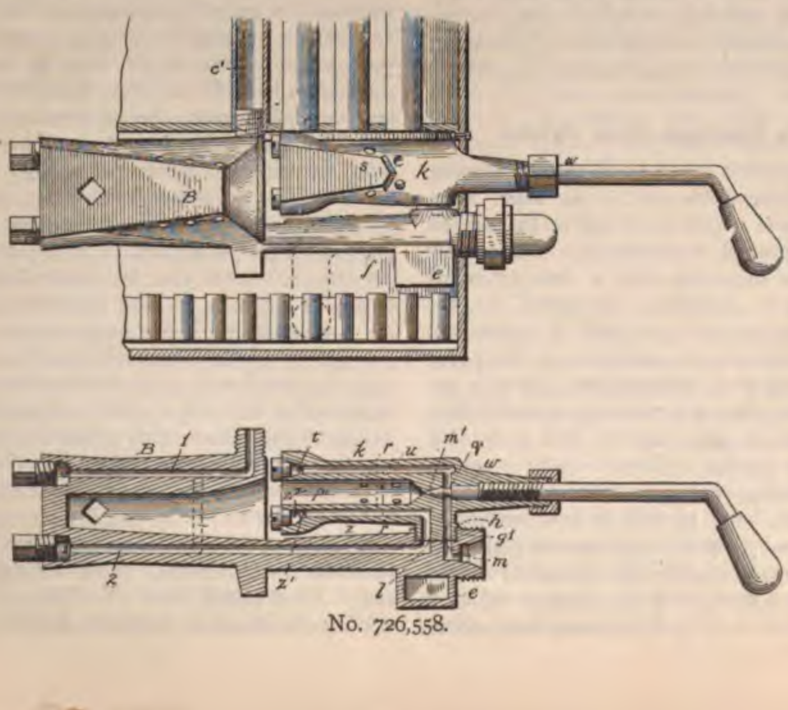
724,259. Resilient Tire for Wheels.—Hazelwood Carmont, Kingston-upon-Thames, England. March 31, 1903. Filed December 31, 1902.

724,261. Controlling Mechanism for Motors.—Charles S. Cole, Bridgeport, Conn. March 31, 1903. Filed June 14, 1900.

724,262. Relief Valve for Motors.—Charles S. Cole, Bridgeport, Conn. March 31, 1903. Filed October 24, 1900.

726,558. Pilot Light and Generator.—T. W. Moran, of Louisville, Ky. April 28, 1903. Filed August 20, 1902.

This generator and pilot light is arranged entirely within the burner chamber. The main casting is provided with a lighting or drip cup *e*, located at the lower rear part of the device, and channels leading thereto. Oil is admitted from central feed pipe *c'* to forwardly extending passage 1 of casting B, flows through the bore of tubular section *c* thereof to conduit *l*, which it ascends, thence through lower central passage *z*, through lateral branches *z'* thereof, through upwardly extending conduits *z'*, through lateral branches *t* to upper central passage *u*, to conduit *m*, through which the oil descends, such conduit opening into the hollow interior of the burner head for the discharge of vapor thereinto at *m'*, such opening being controlled by needle valve *w*. The oil passes around the needle valve at *q* and from the conduit *m* by pipe X to the main burner *b'*.



No. 726,558.

THE HORSELESS AGE

...EVERY WEDNESDAY...

Devoted to Motor Interests

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THE HORSELESS AGE.

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Reduction of Subscription Price.

We believe the time has come when a technical publication like The Horseless Age will find a wider field of usefulness at a more popular price, and we have accordingly reduced the domestic subscription price from $3.00 to $2.00 a year. Dating from January 1, 1903, subscribers at the old rate will receive a rebate in the form of an extension of their subscriptions—six months for yearly subscribers and three months for six months subscribers.

Notice to Advertisers.

Hereafter the first advertising form will be closed on Saturday and the second advertising form on Monday preceding the date of publication. Copy for new advertisements or changes of copy must be in our hands on or before Saturday in order to secure insertion in the succeeding number.

The Bailey Bill Now a Law.

The Bailey bill, the passage of which in the State Senate caused such consternation among the automobilists of New York State, was signed by Governor Odell on Friday last, May 15, and is now in force, the Cocks law being repealed with the passing into effect of the new law. The pressure brought to bear upon the Governor by the various organizations to induce him to veto the bill was unsuccessful. An Albany dispatch to a morning paper states that the Governor signed the bill in the interest of the general public, not of automobile owners.

The repeal of the Cocks law nobody will regret; it was at best a most imperfect measure and reflected a certain "greenness" of the lawmakers responsible for it, aside from the inexperience natural in such a comparatively new field as automobile legislation. The law required all automobilists to register with the Secretary of State, but provided no penalty for failure to comply, the result being that after a short time, when this defect became generally known, registrations practically ceased. The rules regarding initials were also too indefinite, many owners having their initials painted in fine black lines on dark red ground, so that they could not be read 10 feet off.

These defects in the law may not have caused any particular harm either to the public or automobilists, but defects they were nevertheless in so far as they defeated the objects of the law. Either the objects of the law were unworthy or of no consequence, in which case the law deserved repeal, or they were desirable from the standpoint of general public safety, in which case the law should have been so altered as to make it effective.

The defects referred to are obviated in the Bailey law, and the latter is therefore, in some respects, an improvement over the Cocks law. Unfortunately it embodies a number of restrictive measures which are bound at times to be oppressive even to the most law abiding and conservative automobilists. Some compensation for these restrictions may be found in the requirement that local authorities must erect sign posts at all points along roads where the 8 mile limit is to be enforced. One of the complaints of automobilists who have been caught in police traps and charged with exceeding the 8 mile limit under the old law has been that when they were held up they were on a lonely country road and had no idea they were within the corporate limits of any town. The requirement of sign posts to mark the beginning of the slow speed sections will avoid any misunderstanding of this kind, and if a town fails to put up the necessary signs it cannot hold an automobilist responsible for breach of the law.

Rumors are current that cases will be instituted at once by the protesting organizations, and be carried to the highest courts if need be, to test the constitutionality of the law. It is possible a legal flaw may be found in it, and that the courts will not uphold it on that account, but the probability is rather small, and there

is now little hope left of averting the application of the law for the present at least. Automobilists, however, have unanimously registered their disapproval of it, and it will go into effect under the ban of the whole automobile interests of the State.

The Bailey bill having become a law, however drastic and objectionable some of its clauses may seem, automobilists should carefully observe it. The fewer the violations of it the more liberal and more temperate will be the administration of the law, and the better will be the chances of the adoption of more reasonable regulations next winter.

A Nice Distinction for Juries in Automobile Speed Cases.

In a number of recent speed arrests in New York city the plea has been made in court that the machines had become unmanageable and had gotten beyond the control of the drivers. The plea was evidently made on the supposition that it would relieve the operator of all responsibility, although the present law makes no definite distinction between willfully exceeding the speed limit and involuntarily exceeding it—it simply states the limit for different conditions and imposes a penalty for exceeding these limits. It is to be presumed, however, that it is intended to punish willful violations only, and that an automobile driver who was unable to stop his machine owing to some breakage would be no more amenable to the law than a horse driver whose team had run away with him.

There is quite a difference in this respect, however, between an automobile and a horse. In the case of the horse the independent will plays a part, whereas in the case of the automobile everything that happens is the result either of the driver's actions or of his neglect, and whether an automobile really was beyond control or not may prove a rather difficult point for a jury to determine. When a horse is beyond control the outward signs are usually quite conclusive, but this would not necessarily be the case in an automobile runaway.

While there is a possibility of an automobile becoming unmanageable, this possibility is very slight and practically nil under ordinary road conditions. The control of an automobile is not dependent upon any one device, but upon several, each one of which will check the motion of the car. If in a gasoline machine the gear operating mechanism should accidentally be broken while the high gear is in action, the motor might be shut down by interrupting the ignition or by shutting off the gas. If this also should fail the vehicle might be controlled by the brakes. In fact, loss of control of speed is only imaginable where the car has been voluntarily driven at a very high speed and some sudden emergency calling for a quick change of speed has confused the driver. This would be a case of momentary loss of control, however, which would hardly serve as a safe plea in an arrest for speeding.

In hearings on legislative proposals, etc., much stress is always laid upon the perfect control of automobiles, and the many cases in this city recently in which loss of control was pleaded as the cause of excessive speed must have struck the presiding judges as something of an anomaly, a flat contradiction of the claims of automobilists with regard to the control of their machines. The judges seemed to have abundant faith in the machines, however, for in most cases the plea was unsuccessful.

Society, Sport and the Automobile Industry.

It was to be expected that sooner or later the various branches of automobilism—the various aspects of the movement, if one prefers—would cease to harmonize with each other. Already there have been a number of more or less serious clashes between the purely business interests on the one hand and the society element on the other. So far the society element has been very potent in directing the affairs of automobilism in general, because, being by far the most important customer, manufacturers and dealers have left to it free and undisputed sway. Changes in this respect are noticeable, however, with the growing utilitarian character of the automobile and as the industry becomes more firmly established.

A peculiar conflict of the two extremes in the movement has arisen in Germany in connection with the selection of the team for the Gordon Bennett race. This race is supposed to be a sporting event, but undeniably it has also a very strong business aspect. The race is nominally a contest between the various national clubs. Curiously enough, these clubs do not bear the financial burdens connected with the construction of the racers and their transportation to the scene of the contest. These fall upon the manufacturing companies who engage to represent the clubs.

Now, manufacturing companies being organized for business purposes and not to encourage sport, the whole proposition is transformed into a business affair. The manufacturers who enter for the race consider the outlay it requires as an advertising investment, and very naturally demand that business principles and the conditions of free competition should prevail in the contest.

One of the rules of the race stipulates that cars must be driven by members of the club they represent. This rule has led to dissensions between the German Automobile Club and the firm which builds the vehicles to represent it. The latter naturally picked out the best drivers it could find, but it so happened that two of them were not members of the club. Application for membership was made in their behalf, but upon examination it was found that one of the candidates—the one, moreover, who has the best racing record to his credit—did not possess the necessary qualifications for membership; in other words, he had no social standing. This made him impossible as a driver in the Gordon Bennett race, and the manufacturers, finding themselves thus handicapped in the selection of drivers for their cars, threatened to withdraw entirely from the contest. A meeting of the executive committee of the club to revise the rules relating to qualifications for membership was called without results, and in consequence any driver representing Germany in the Gordon Bennett race must have a social standing if nothing else.

The German Automobile Club undoubtedly has a right to be as exclusive as it pleases, but if it chooses to be so exclusive can it properly represent the industry of that country? If manufacturers are to pay all costs of the contest while the clubs are to determine who shall drive the vehicles, there is opportunity for much friction, and if this rule is adhered to manufacturers are likely in future to be less eager for the privilege of building racing machines than they were this year.

The Great Contest for Next Fall.

Early last week a number of dailies offered the information that the Automobile Club of America had decided to hold an endurance contest from New York to Montreal, Canada, and back, in October next.

A few days later it was pointed out that a run into Canadian territory would meet with obstacles at the border, owing to some recent decisions of the Dominion customs authorities. A representative of THE HORSELESS AGE, who called at the clubhouse on Saturday last, was informed that the announcement of the run to Montreal in the dailies was premature, as nothing definite could be said on the subject as yet.

It will be remembered that New York-Montreal and back was mentioned as a possibility for this year during the Boston run last fall. We have never been informed of the exact advantages of this route, but understand that some gentlemen in Montreal interested in automobile enterprises there are backing the proposition. It would seem that a better route could be found entirely within the United States, and, incidentally, all bothersome customs formalities avoided. The Canadian customs rules with regard to automobiles have within a few days been made much more drastic, and it is now impossible for a tourist to enter Canada with his car without paying the full amount of duty thereon. The formalities in crossing the frontier both ways would entail a great deal of delay and bother, and this alone tells strongly against the route.

In the selection of the route both the character of the roads and the possible interest in automobiles in the territory traversed should be considered, and in the latter respect a run either up the Atlantic Coast or from New York city to Buffalo or Cleveland would have distinct advantages over the New York-Montreal route. New York-Cleveland, if made in six days, would present as difficult a test as most entrants would wish, especially if the weather should be unfavorable, and a run between the greatest automobile distributing centre and the greatest automobile manufacturing centre of the country—with all due respect to Detroit, which undoubtedly manufactures more automobiles than Cleveland, but not nearly as many makes—would be appropriate in other respects.

Electric and Hydraulic Transmissions.

The enforcement of the Selden patent is bound to increase interest in transmission systems for gasoline machines in which there is no mechanical driving connection between the gasoline motor and the driving wheels, and therefore no disconnecting device, such as electric, hydraulic and pneumatic systems. Of these, electric transmission has so far received the greatest amount of attention, having been developed in a number of different forms. One of the most promising systems would seem to be that exhibited at the recent Belgian show and described in our report of that show, in which the dynamo and motor are located side by side, the moving parts of the two machines being entirely independent from each other, that of one being connected to the engine and that of the other to the drivers of the car. The flexibility of this system has much to commend it, although the efficiency of transmission at slow car speeds must be low.

The hydraulic system has been developed particularly by W. v. Pittler, of Dresden, Germany. His system comprises a gasoline motor driving a rotary pump, directly, and two or four hydraulic motors, essentially rotary pumps, one directly connected to each driving wheel. The working fluid is lubricating oil. This system entirely dispenses with gearing, and change of speed, reversal of direction and braking are effected by means of valves in the oil conduits. When it is desired to shut the power off from the car without stopping the engine a three way valve near the oil pump is set in such a position that it connects the suction and discharge passages of the pump, in which case the oil circulates through the pump without passing through the motors. To reverse the direction of motion the admission and discharge openings of the motors are interchanged. For coasting the admission and discharge ports of the motors are thrown in direct communication by means of a valve, and for braking this communicating passage is throttled. Change of speed is effected by throttling. The entire power control—starting, changing speed and reversing—is effected by means of a single lever.

Among the special advantages of this system of transmission are its absolute noiselessness and freedom from wear and rust, owing to the thorough lubrication of all parts. The drawback is the same as that of electric transmission—low efficiency. The hydraulic motors are exceedingly compact, a pair used on a voiturette which Herr von Pittler drives himself being only 4 inches in diameter.

What the Bailey Law Requires.

The Bailey bill was signed by Governor Odell on May 15, and every owner of an automobile in the State must within thirty days from that date file with the Secretary of State, Albany, a statement giving his name and address, and a brief description of the vehicle, including the maker's name and the number of the car; fee, $1. Every person hereafter acquiring a vehicle must make similar application within ten days from date of receiving same. Every person desiring to operate an automobile as mechanic, &c., must within thirty days file with the Secretary of State a statement giving his name and address and description of vehicle he is able to operate; fee, $1. All the above classes will be duly registered and have issued to them (at no additional expense) a registration certificate which must be constantly carried along in driving. The registration number for a car must be carried at the back of the car in black Arabic numerals, not less than 3 inches high and stroke not less than one-half inch on white ground. Certificates must be shown to police officers upon request.

SPEED.

There is absolutely no speed restriction in the open country, but boards of supervisors of any township may fix the limit as they desire, but not below 20 miles per hour. Towns and cities may adopt ordinances fixing the speed limit for densely built up sections at not less than 8 miles an hour and for sections in which buildings are more than 100 feet apart at not less than 15 miles an hour. Speed must always be reduced to 8 miles an hour (1) in passing pedestrians or domestic animals being driven on the highway in either direction; (2) in passing a public school during school hours; (3) within a distance of one-half mile of any post office, provided the local authorities erect at the limits of such sections signboards with an arrow indicating the direction and the words "Slow down to 8 miles"; speed must also be reduced to 10 miles an hour in passing a church on Sabbath during the usual hours of worship, and to 4 miles an hour in crossing a dam or causeway where the traveled road is less than 20 feet wide.

The complete text of the law appeared in THE HORSELESS AGE of March 25.

Calendar of Automobile Dates and Events.

May 23.—Floral Parade of the Long Island Automobile Club, Brooklyn, N. Y.
May 24–26.—Paris-Madrid Race.
May 25–30.—Alcohol Motor Wagon Trials at Berlin.
May 30.—Massachusetts Automobile Club Race Meet.
May 30.—Hill Climbing Contest of the New York Motor Cycle Club.
May 30.—Automobile Race Meet, Empire City Track, Yonkers, N. Y.
May 30.—Club Run of the A. C. A. to Yonkers.
May 30.—Endurance Contest of the Colorado Automobile Club, Denver.
June 18–20.—Paris Automobile Fetes.
June 18–28.—Aix-les-Bains Auto Events.
June 20–21.—Circuit des Ardennes.
July 1–15.—Irish Fortnight.
July 2.—Gordon Bennett Cup Race.

Single Tube Tire Treatment.

By C. Will Travis.

It is doubtful whether an accurate record of the service of a single set of 2½ inch, 3 inch or 4 inch single tube tires would make very interesting or instructive reading, but by grouping the experiences of various operators with the three sizes, gathered in observations extending over a period of as many years, some few items may be found that will prove of value to the layman. My own tire troubles, though slight in comparison with some other people's, have more frequently come bunched than otherwise. Whether this condition is universal or not, it is beyond doubt that almost every autoist is of the opinion that his individual trouble department is the most vexatious on record.

Now, when trouble occurs to the single tube tire, some little understanding of the peculiarities of such tires may prove of assistance to those who may still be floundering about in the dark. There are several "don'ts" to be remembered in the treatment of the single tube tire if one expects to get a maximum service without too frequent turns at the pump, whether in the barn or while on the road.

Experience has taught some of the older class in auto philosophy that it never pays in the end, no matter what the conditions, to use any of the so called "anti-leak" preparations, whether it is a commercial article sold in tin cans by the retailer and composed of glycerine, emery, &c., or one's own compounded, infallible glucose and corn meal. They are all more or less injurious to the rubber of an air chamber, or inner tube of a tire, and will sooner or later cause regret for having adopted the makeshift—or short cut as it were to the goal of air tightness.

When a single tube tire has been punctured, and the puncture is too large to be perfectly repaired by the injection of a button of some of the good liquid rubber compounds to be found on the market, don't beguile yourself into the idea that the insertion of a rubber plug will end the trouble. Although it may for the time being give a certain degree of relief, its durability is short lived at the best. The few threads of the canvas fabric that are sure to be stretched, and probably broken entirely, in inserting the first plug will never unite, and the continual strain on this weakened point is almost sure to enlarge the hole, and will then call for a larger plug. By this time the hole probably has been so much enlarged and the fabric so weakened that the largest plug fails to hold, and even the factory is now unable to make a permanent repair, while had the tire been sent to them before the first plug was inserted, it could have been vulcanized and a most satisfactory result obtained.

This would have cost much less, for it is now more than probable that a new tire will have to be purchased, and this can all be traced back to the use of a plug in one's *anxiety to be going again.* An extra tire will always be found to be an economical investment. Had an extra tire been on hand to allow sufficient time to be given to the necessary repairs, they could have been done properly and at a much less cost.

If a tire will not hold air for more than a day or two before becoming too soft for service, and yet the leak cannot be traced to any definite source, the trouble may be attributed to several causes. The majority of cases are actually traceable to some external injury of the inner tube, yet it frequently happens that the inner tube has been chafed or punctured internally by some hard jolt while going over a sharp angle, if the tire is not as fully inflated as should be, or if it has been continued in service while so soft as to injure the side walls of the inner tube. From the looks of things there are several leaks on the tread, as shown by the air escaping from numerous little cuts in the rubber, but were each treated individually it is more than probable the real seat of the trouble would not be reached.

In this case any kind of "anti-leak" will always give instant relief, but the day of reckoning is yet to come, and like fate is ever approaching. Sooner or later you will have a puncture of such an extent that even the "anti" leaks, and leaks badly, and every effort to stop the flow of mess and gorm will prove unavailing, and the return home will be one of mental disturbance, prolonged to nearly a torture by the slow progress made necessary by an effort to move with as little injury to the lame member as possible. A plug may then be tried, the "anti" having been cleaned away from the inner surface surrounding the hole and the surface cleaned, given a coating of rubber patching cement with an L shaped wire, and every precaution taken to make the job a permanent one; and so it looks upon completion, but a few miles' use will tell a tale of woe, when the air and probably the plug itself leaves the tire en route.

In all probability you have been told and are under the impression that should vulcanizing be necessary at any time the "anti" fluid can be washed out of the tire with water and make the vulcanizing possible. So it can, but it is impracticable, for the life of the inner tube rubber has been partially deadened by the chemical action of the "anti" to such an extent that the adhesion of the rubber during the vulcanizing process takes place in such a half hearted way that the effort is really hardly worth while. If necessity demands the placing of a solution of any kind in a single tube tire to prevent a slow leakage of the air, it should be nothing other than some one of the good liquid rubber compounds, a number of which are marketed by the various tire manufacturers, such as "Korker Compound," made by the Kokomo Rubber Company, but it should be sufficiently thinned with gasoline or other solvent to permit it to be forced into the tire through the valve stem with a bicycle hand pump. A pure rubber compound, being adhesive, will more perfectly coat the inner wall of a tire than any substitute, and stop all leakage of air, whether caused by small punctures or having been driven soft. This gives as a result a perfect air chamber, requiring no further attention until this new lining has been either punctured or broken by some new cause.

It will readily be seen that by thus treating a tire with pure rubber a union is produced unobtainable by the use of any foreign substance, to say nothing of the advantages of a material not detrimental to the life of the rubber. Then, should the time arrive when it would be necessary to send a tire thus treated to the factory for the repair of a puncture of more than usual extent, the vulcanizing will take place in a most satisfactory manner, as the quality of the rubber has not been impaired by a deteriorating action of some foreign substance, thus giving better results in every respect, and that most to be desired result, a much longer tire life.

To treat a tire with any of the liquid rubber compounds, remove the wheel from the vehicle, place in your bench vise a round iron bar that will pass through the hub of the wheel, and upon this place the wheel for convenience in working. Remove the valve plunger from the valve, see that the ball valve in the hand pump has been removed and that its plunger has a perfectly free opening. Thin the rubber compound with gasoline or other solvent to about the consistency of a syrup that will work through the hand pump smoothly without any great effort. Fill the pump and force the compound into the tire with the valve stem at the bottom of the wheel, and repeat this operation two, three, four, five or six times, depending upon the condition and size of the tire. Now revolve the wheel slowly, that the liquid may have a chance to flow freely over the inner surface of that part next the thread.

Now, to make sure that the liquid will reach the side walls of the tire, remove the wheel from the iron bar and lay it flat on the floor for five or ten minutes, then a few slow revolutions on the bar in the vise again, and again lay it flat upon the floor, but with the other side down.

Go through these same evolutions again, but while the tire is on the floor pump it up to about half the normal air pressure, and when again placed upon the bar deflate it and revolve the wheel slowly; again repeat the inflation and withdrawal to further evaporate the gasoline or other solvent, and cause the rubber to set. If one has the patience and a little time at disposal this process will make a perf satisfactory job, for were you to cut a tire thus treated you would find there had been formed an absolutely and airtight lining or inner tube in otherwise troublesome, leaky old tire. Like a watch, it is not the case that should

ked upon to estimate its value, but 'hich the case contains, to judge of rth.

hint to the wise," etc.

extra tire is an economical invest-

n about to put "anti-leak" in a sin- be tire—don't.

a rubber compound instead.

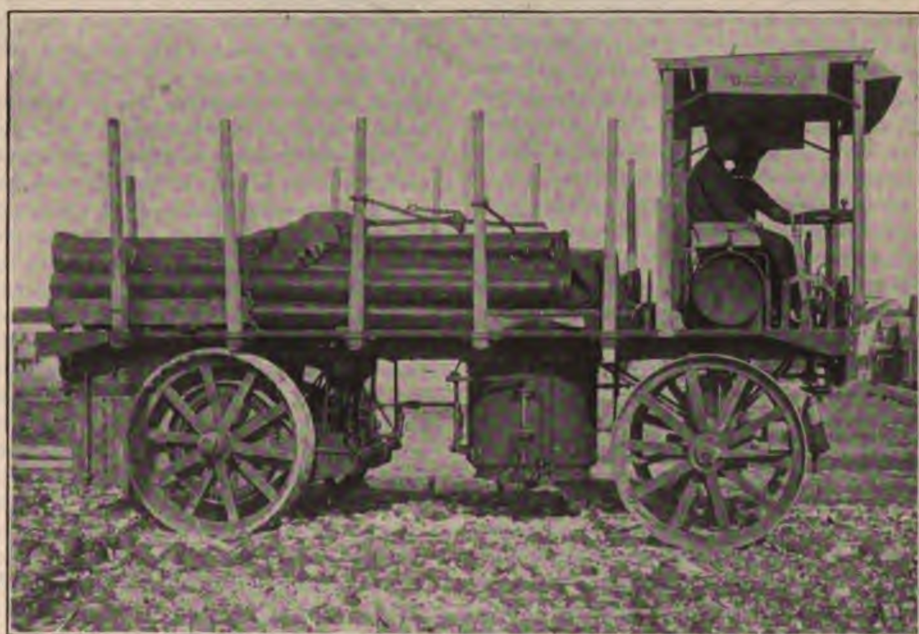
n about to insert a plug in a single ire—don't.

l the tire to the factory instead.

The Kelly Steam Truck.

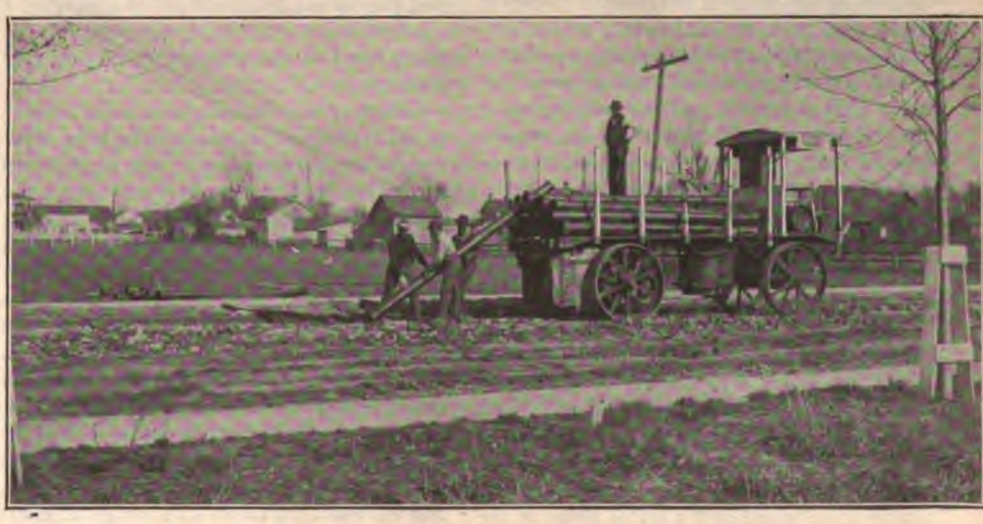
show herewith a number of views of eam truck built by the O. S. Kelly ny, of Springfield, Ohio. The truck shown loaded with 11,000 pounds of on piping which, we are informed, it d quite easily at good speed up and grades. No dimensions and other re yet available, but what is un- dly the most interesting feature of w machine is plainly shown by the

platform truck the platform must rily be entirely free from machinery, e two available places for the boiler gine are in front in the cab and be- e platform floor. The usual arrange- o far has been to locate the boiler in) and the engine horizontally below tform. The location of the boiler in as advantages and disadvantages, the mportant disadvantages being that uch a truck is unloaded a too small ion of the total weight rests on ving wheels, and the latter have in- nt driving adhesion, unless rubber Secondly, the fire box is likely to e with the front axle unless the is placed quite high up. In the ruck both the boiler and the engine ced below the platform floor, and re arranged vertically. The water so is arranged below the floor in the ut this is a common feature. This ment of the machinery, of course, ates a rather high platform, but the of gravity is always quite low. The s evidently fired with liquid fuel, a fuel tank being shown at the side of the driver's seat, and the location of the burner being ill adapted to the use of solid fuel. The drive will be seen to be by spur gearing. The photos incidentally show some examples of our city streets in spring time.



Kelly Steam Truck.

A Load of 11,000 Pounds.



Kelly Steam Truck.

LESSONS OF THE ∴ ROAD ∴

Experience with a Touring Car.

By Robin Damon.

In a recent communication to your paper an automobile owner said that probably most of the trouble of beginners came from inexperience. Occasionally I have had similar thoughts, and at other times my ideas have been different.

I recently purchased a touring car of a popular make, the carriage being represented to be "in perfect condition—as good as new." Well, the machine arrived, and it certainly did look well. After working over the carriage an hour or so, with a stout young man at the crank, the engine started, and it ran steadily, both cylinders giving a good explosion. Although the roads were very muddy I could not resist the temptation to travel a bit, and the way the machine went over the heavy streets satisfied me that I was handling a real automobile all right. Hills that my old engines had found hard to climb on low speed were surmounted on the high gear at from 15 to 20 miles an hour, even with five people on board. I went probably 20 miles without a skip of the engine. Then I stopped in front of my office for a few minutes and let the engine rest. When I tried to start again the mechanism refused to respond to the caresses of the crank. I fussed around an hour and then walked home to dinner.

A GROUNDED WIRE.

While eating I tried to think of experiences I had read about similar to my own, and I remembered that some other unlucky man had been stalled with a jump spark outfit because one of the high tension wires was grounded on the frame of the carriage. I returned to the task, and, after securing a muscular youth for the crank, we started investigating. The youth made one or two whirls, and then yelled that he was being shocked. I overhauled the wires and found that the one leading to the forward cylinder leaked electricity, so that a good sized spark was jumping onto the steel framework. I tied the wire up so it was not in contact, and then the engine gave a puff. The difficulty was solved instantly, for the machinery was soon whirling. I ran the machine to my stable, and the next day put in a new wire. That remedied the difficulty.

DEFECTIVE WIRES.

For three days the carriage ran perfectly. Then one afternoon, while about 4 miles away, there was a succession of explosions in the muffler and rear carburetor, with apparently only one cylinder running. I didn't stop to investigate, but turned about and started homeward. The carriage made pretty good speed and a lot of noise, as the explosions occasionally came in bunches, being almost like a volley of muskets. After getting to the stable I commenced a search for the trouble. It took me an hour to find that the bother came from the rear inlet valve. The instruction book says that "although the valve is so easy to take off, it is advised not to remove it too frequently," or words to that effect. I should really like to know if the writer was really in earnest, or just sarcastic. I did not find the job easy enough to make it inviting. Anyway, I finally got the valve out, and then found that a retaining nut on the end of the valve stem had slipped off, because a bit of copper wire that held it had broken. I put in a steel wire, well riveted, and replaced the valve.

Evidently the adjustment of the gasoline was disturbed, because the engine did not work just right. It took several trials to get the engine in condition. Two days later, after a fine run of 50 miles, while returning home I noticed that the engine did not respond to the throttle, but kept running at a racing speed. The only way I could get to a moderate rate of progress was to retard the spark to the lowest limit.

On reaching home I again made an exploration, and found that a wire that had projected from the inlet valve, by which its operation could be judged when running, was missing, and that air was hissing through the hole left. I drove a wooden plug into the hole, but it did not have any effect, as the engine would race all the time. It was a pleasant Sunday afternoon, but I passed it in overhauling all the air pipes and valves. Finally I took a rest by going on a trip in an electric carriage. That soothed my brain so much that I decided that the difficulty must be with the missing wire from the inlet valve. On returning to the stable I had the valve taken out, and then the trouble was located. The throttle government is by air, and the wire had been fastened to one end of the pneumatic valve, a hole having been drilled through it. When the wire fell out it left a hole, through which the air passed, and thus the engine was not governed. A machinist put in a new wire and tried to adjust the valves, but he did not succeed. I worked three or four hours getting the thing fixed so the cylinder would run regularly.

A day or two later I took a party on a 50 mile run, and when coming back, running over a fine road, I felt a series of severe bumps from the rear. It was a flat tire. Luckily I carried an extra inner tube, and on inquiring I found that there was a village blacksmith near. I ran at slow speed to his shop and tried to borrow a wheel jack, as I found that mine had been left behind. The man did not have a jack, but lifted the axle with levers. I took off the tire in a few minutes and tried to use the new inner tube, when I found that the valve stem was too large. The blacksmith said he guessed he could bore out the hole, and he managed to do so after great exertion. At that point I found that my air pump was useless, because the valve [...] However, the village bicycle shop m[...] nigh and he kindly loaned his pum[...] also aided in putting on the tire. [...] about thirty minutes to do the jo[...] then I started homeward at fast spee[...]

The following day I took out a pa[...] the carriage went very slowly, requirin[...] gear most of the time. I found th[...] culty was in the gear case, from wh[...] oil had leaked, so that everything w[...] The same evening I was again on th[...] and soon there was a series of lou[...] ping from the forward carburetor. [...] to the stable and discovered that the [...] soldered brass connecting ring on [...] of the wire had parted from the [...] strands. The points of the spark pl[...] also turned. The repairs took half a[...] and then the engine went finely. T[...] afternoon I had planned to run to [...] riage builder to see about getting [...] in the tonneau. I stopped for a frie[...] is an enthusiastic automobilist, and [...] not gone far before the engine [...] missing explosions, so that with lo[...] clutch we could barely move. Th[...] up for a mile, when operations w[...] sumed in good shape. Whatever th[...] was I did not find out. I star[...] home, and when within a short dist[...] my office the engine stopped su[...] Another investigation proved that t[...] tact spring had broken. I put in [...] spring, but it was not right, an[...] though I worked two hours I co[...] make the engine run, because the [...] would not break the circuit quickly [...] In the evening I went to Boston [...] train, and visited three automobile [...] stations, but I could not find a [...] spring on any wagon of the same [...] The next forenoon I took the spr[...] and put in a longer point of silver [...] made a strong contact and the engin[...] ed, so that I ran the carriage hon[...] it had been out all night.

At this time the engine devel[...] whine that sounded like a child w[...] croup. I first thought the noise ca[...] a dry cylinder, and spent some tim[...] ing in oil, until the engine was c[...] Finally I discovered that a piece [...] packing in the engine case had blo[...] leaving threads, through which [...] blown, making a whistle. It was [...] job to take off the cover that I ma[...] porary repairs with bits of wood.

Speaking of trouble, I have a n[...] who has just bought an automobil[...] which he is having more or less fu[...] was out last Sunday, and on meeti[...] Monday I inquired what luck he h[...] with on his trip. He replied: "O[...] We went 25 miles, and we were able [...] almost home before the engine st[...] He left the carriage 2 miles from [...] ble and had a horse drag it the rest [...] way.

Although I have gone into th[...] bothers of my new machine to so[...] tent, I do not want readers of thi[...]

think that I have any hard feelings ard the carriage. I can see that it is a machine, and I know that when in or- it has great power and all the speed I for. I do not blame the makers for bits of trouble, for I do not see how could build a carriage that would not e some difficulty when operated at high d. It puzzles me how other owners he same make of machine can stand up deliberately affirm that they never do hing to the carriage.

have an older carriage of the same e, which I have been trying to get commission for some weeks, after a er of idleness. I found that the engine ed over very hard, the difficulty finally g located in the clutches, which had d with grease and dust. This was ned out with kerosene, but not until carriage had started across the floor the engine was running and collided a sink. To get the machine in order ve had to put on a new chain, new ch, new batteries, new rear tires and t and varnish, making an expense ac- nt of perhaps $200.

have previously spoken of my experi- with electricity as a power, and I want eaffirm my previous praise. The elec- machine is always ready to run, and cost of operation is nothing when com- d to the worry and machinists' bills nected with any other source of power. ften use the electric to run out after a hinist to work on the other machines. intelligent man has more than once that he did not see why I bothered gasoline when the electric was always rder.

Some Troubles with Gasoline Automobiles.

By Harry B. Haines.

the past year I have owned four auto- iles, two rated in the cheap class and in the medium priced class, i. e., cost- $1,500, and from my experience with n I am prepared to state that the y cheap automobile is an expensive stment, for the owner of it nine times of ten pays the repair man the differ- in price between his car and a more ensive one, in buying the parts and workmanship which the factory failed upply.

part from my own machines I have the opportunity of watching the daily ation of half a hundred other cars of ous makes which were stored in the station with my own, and I have particular attention to the troubles ailments which have resulted in their g laid up.

summarizing automobile ailments I d that the greater portion of them in connection with the water circu- n and the component parts of the m, such as pumps, radiators, "rotten" and leaky gaskets. The actual re- needed to remedy these defects are difficult in themselves, but the expense comes in the time necessary to reach the damaged part. For instance, in a light runabout that I am at present operating the radiating coils are located under the footboard of the carriage, and when they spring a leak, as they do with commendable regularity, it is necessary to remove all the floor boards, unfasten four braces and bolts, disconnect a water joint (that seldom can be made tight again), and after all the water has run out of the tank and coils remove it and find the leak. This operation requires an hour or two and means an expenditure of about $1.50. The tubes of the coil are of thin copper, used no doubt to secure most efficient radiation, but they are not strong or stout enough. It would seem that a stronger material at this point would remove at least this one source of annoyance.

Going from the radiator we have the water gaskets in the cylinder, which very often without the slightest provocation burn out or blow out. A cylinder head gasket gone, it is necessary to take off the valve springs and cams, unbolt the explosion chamber from the motive power, allow all the water to run out of the tank and coils, and finally pull the explosion chamber end of the cylinder off and scrape off the remains of the asbestos packing.

This done, it is necessary to cut a new packing of wire asbestos, which is no easy task, as the proper spaces must be left for the water to flow through. The gasket once cut, it is fitted into place, and the explosion chamber is replaced and drawn tight with the bolts provided for that purpose. If one is lucky it may hold the first time, but I have seen as many as half a dozen gaskets put on before one was secured that would keep the water out of the cylinder.

If the gasket holds water when tested, it is necessary, of course, to replace the cams, and very often the spark rod adjustment has been moved and must be retimed. Eventually the carriage comes out of the repair shop, and with it a bill for from $3.50 to $5 as the case may be, and it is ready to run again until the gasket sees fit to give out and fill the cylinder with water.

Leaving the water cooling system and delving into the very heart of the carriage, the piston and cylinder, I was shown this week a most interesting result of what was purely faulty construction.

In the machine I refer to the wrist pin holding the connecting rod at the piston end is fitted with expansion screws which hold it in place and may be tightened up to take up wear. Peculiarly enough, these expansion screws are not provided with set screws on the inside of the piston to hold them in place after they are once set up to the point desired. The car in question belonged to a friend, and all the local experts had been troubled to account for a mysterious loss of compression, which of course rendered the carriage hors de combat. After experimenting for a week or more, it was decided to take the carriage apart from "stem to stern" and rebuild it, hoping in that way to locate the trouble. When the piston was drawn out of the cylinder it was noted that one of the expansion nuts, the one on the right side, had worked out beyond the bearing surface of the piston, and had cut a groove in the cylinder at least a sixteenth of an inch deep and extending for almost the entire length of the piston stroke. The cylinder wall was so thin that it was found impracticable to bore the cylinder out again, and for a time it seemed as if it would have to be discarded and a new one purchased.

It was finally decided to put set screws on both expansion screws on the inside of the piston, and this done the carriage was put together again. Luckily the cuts on the cylinder ended a short distance before the compression point, or at least before the point of highest compression was reached, and it was found possible to start the motor by turning it over very quickly. Once started it would run, unless allowed to speed down very low, when it would stop.

To fasten the main shaft bearing on the transmission gear side, where the greatest strains come, with two half inch stud bolts which grip into threaded holes in an iron frame by two threads each, would ordinarily not be considered the best of ideas, yet that is done in a well known light runabout of standard make. The faultiness of this construction was forcibly demonstrated to me on a trip one day, when, by the continual wear caused by the strain of changing gears, one of these stud bolts wore away the thread in the iron frame into which it fitted, and the whole end bearing of the main shaft began wiggling about. I stopped at a country blacksmith shop, but found that owing to the braces on the transmission gear it was impossible to get at the bolt without taking off the body of the machine, as these blocked the passage of the necessary tools. One bolt was still holding, but every time I threw the gear in the whole main shaft moved forward a quarter of an inch or more against this bolt, and I was doubtful as to whether it would hold very long.

As it was nearing nightfall I decided to take the chance of getting home, and actually did succeed in reaching the storage station, 20 miles away, without accident. The next day I had the other stud bolt removed and had two heavier bolts with lock nuts on the under side put into this most important place, and I was never troubled again at that point. Many of my friends owning similar machines have had like troubles, and, although it is only a small matter, it assumes very large proportions when a man is stalled by it miles from home. It is the attention to these small things that is going to accomplish more than anything else toward the realization of the "perfect" automobile.

The Imperial Automobile Station have opened a complete up to date garage at 52 and 54 West Sixty-seventh street, New York.

Maintenance. and Repairs.

IV.—Feed Pump Repairs.

By W. O. Anthony.

The form of lever used to operate the boiler feed pump on many steam machines is subject to excessive wear, owing to the rather high speed of the operating pin in the crosshead, combined with a rather heavy duty when pumping against the prevalent heavy boiler pressure.

This lever is of the form shown in Fig. 9. The principal wear is along the upper and lower edges of the slot A. There are two simple ways of taking up this wear. If the pin in the crosshead shows the greater wear, it is a good plan to remove it, which in most machines may be done by gripping it tightly in a vise and striking the wrist pin with a copper or babbitt hammer, or if, as is sometimes the case, the wrist pin and pump pin are integral, the wrist pin portion may be clutched in the lathe, and after sawing off the pump lever pin drill out a one-quarter inch hole one-half inch deep. Now turn up a new pin from good tough steel, making the end which is to drive into the wrist pin a good driving fit, and the other end, which must be made the same length as the old pin, say one-thirty-second inch larger diameter than was the original. The slot may now be filed out, being very careful to get the new edges parallel and square with the sides of the lever. It should be filed until it fits the new pin a good working fit.

Should the pin show the lesser wear and be in fairly good condition, the slot may be put in a vise and by careful manipulating be closed together sufficiently to allow of filing to a new surface, so it will fit the old size of pin.

In closing this slot, as above described, after the centre has come together sufficiently a block of metal or a chisel blade or screwdriver should be inserted at this point to prevent further closure, and this will result in a compression of the metal at either end until the slot is approximately parallel.

The writer has found that much longer life is obtained in these parts if the slotted end is case hardened after filing and fitting, as well as the outer end of the pin. In the absence of regular equipment for this work, it may be done in the following manner:

Place the parts to be case hardened in broken charcoal in a pan or crucible. With a plumber's blow torch, the flame of which is directed into the charcoal upon the pieces, bring them or the parts of them to be thus hardened to a cherry heat. This method of heating is to be preferred to putting them into a forge, which, although perhaps a little easier and quicker, is apt to interfere with the proper hardening from the presence of sulphur and other impurities in the coal. Now have ready some yellow prussiate of potash pounded up quite fine. Put this into a tin can, and as soon as the parts to be hardened reach the required degree of heat dip them into the prussiate of potash, and stir them around thoroughly until these parts have taken up all they will of the powder. Put back into the charcoal and slowly bring up to a cherry heat again, and when this point is reached dip the part to be hardened into water endwise and hold there until the whole piece is cool. Of course, where the whole piece is to be hardened it is simply dropped into the cooling water, but always in an endwise direction, as if dipped flatwise the piece will warp. The water should not be ice cold, as this has a greater tendency to crack the thin parts of the metal. Water at about the temperature of the shop will be found right. If the hardening has been properly done the surface will present a frosty, white appearance intermingled with more or less blue and gray portions, and will be so hard that a file will not touch it.

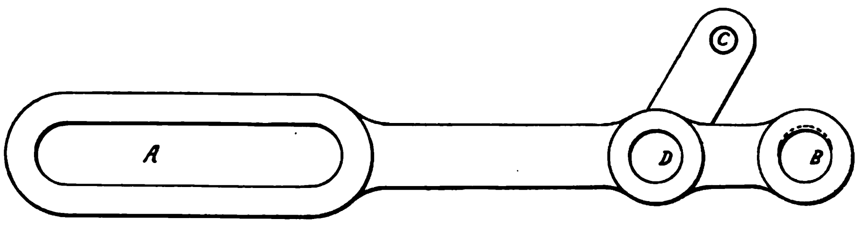


Fig. 9.

The hole B, Fig. 9, which receives the pin connecting it with the forked portion of the pump connecting rod, will wear to an oval form, as shown by dotted lines, and this will result in much lost motion, interfering seriously with the water supply. To remedy this, drill out the old hole to a size enough larger to bring it very close to round. Now drive in a piece of steel which will fit the new hole quite tightly and saw off, leaving about one-sixty-fourth inch projecting from either side. Rivet over these ends tightly all around, having previously slightly countersunk both sides of the hole to form retaining heads for the piece rivetted in. Now centre punch and drill out a new hole.

It will generally be found a good plan to ream a new hole after this, with the two parts held together in their relative positions, as the holes in the pump connecting rod are quite certain to be oval.

A new pin may now be made to fi and should be case hardened. If dr of just the right diameter is at hand far easier to cut off a piece of this ing enough to project over either end small spring cotter pin, one of thes ing the place of a head in a fitte which is much more work to make.

The hole in the engine frame into fits the pin C, Fig. 9, generally also badly, and to correct this it is as v simply ream out the old hole to large enough to bring it to round.

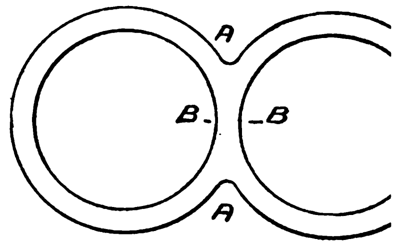
A new pin may now be turned up the hole D in the lever and with its end a close working fit in the new l the frame.

Twin Cylinder Design.

Referring to our recent editorial above subject, a correspondent in th *lish Mechanic* (which reprinted the a writes as follows:

Having been one of the first to double cylinders for oil motors cast plete with combustion head, I hav certain difficulties to contend with time and another.

Having made a number embodyi single wall and double wall principle



found in boring and machining that of those with the single thickness of were porous to a certain extent b the two cylinders; the other portion inder being of closer grain, which I attributed to the angle filling betwe two bores thus:

The contraction of the greater m A A in cooling, drawing the single ness at B B into a porous conditio with cylinders cast with combustion ber down, the porous portion would ly be at the combustion end.

I expected to see the new "E. M. tor with a double wall, as my expe has proved such cylinders more relia this respect, although with cranks degrees a very slight leakage from on inder to the other is not of such importance, but with cranks in lin defect would prove fatal.

The double wall method need not a great difference in the width of ders, as water space need not be be the two; although, if so, the water co effect would be of a more even cha but cannot think the alternate heatin cooling would have much effect quick running motor.

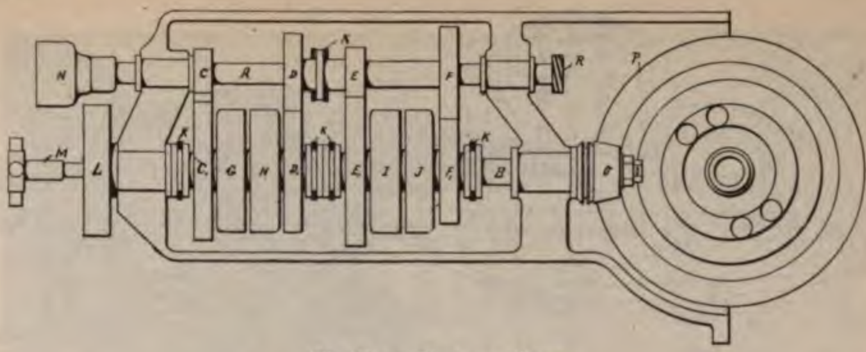
NEW VEHICLES AND PARTS.

The Twelve Horse Power De Dion Car.

(Concluded.)

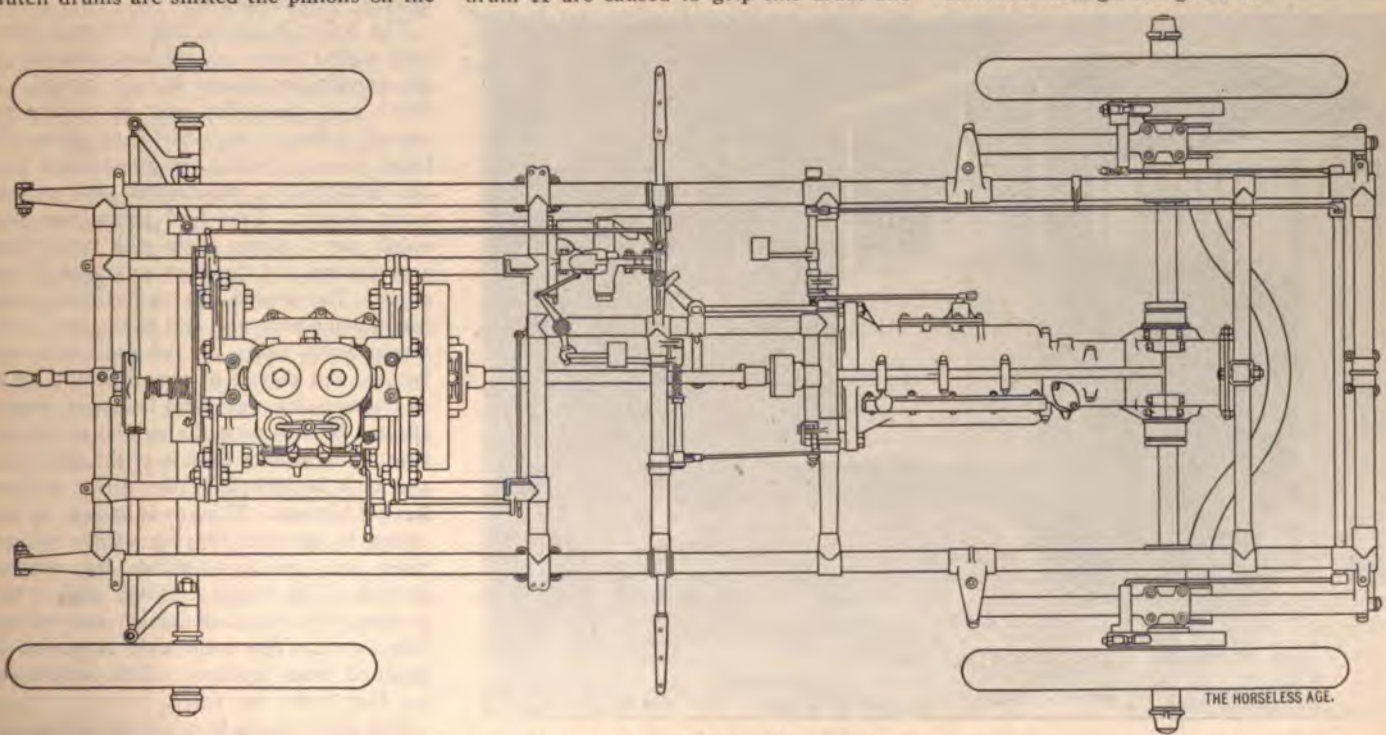
The Transmission Gear.

The change gear is a new embodiment of the De Dion individual clutch system. It gives three forward speeds and one reverse. The gear is entirely enclosed in a casing which also encloses the bevel gear rear axle drive and differential gear. The gear comprises two friction clutches of the expanding block type, which are operated by means of a rack passing through the centre of the clutch shaft. In Fig. 1, A is the pinion shaft, which is driven from the engine shaft through the universal joint N. Upon this pinion shaft is arranged a slidable sleeve carrying four pinions C, D, E and F. Upon the second transmission shaft B are arranged four corresponding gears, C_1, D_1, E_1 and F_1. The pinion C drives the gear C through an intermediate pinion, and this constitutes the reversing train. The pinions D, E and F mesh with the gears D_1, E_1 and F_1 respectively, and all the pairs of gears remain constantly in mesh. Each of the four gears upon the secondary shaft B is fixed to a clutch drum, the four drums being indicated by G, H, I and J respectively. The gears and drums are loose upon the shaft B, but may be fixed thereto by means of the two expanding block clutches. As there are only two clutches and four clutch drums, the latter, together with their attached gears, must be shifted on the shaft B to bring them over the clutches, and to this end each of the gears is provided with a grooved collar with which engages a shifting fork K. When the gears and clutch drums are shifted the pinions on the shaft A must be shifted correspondingly, in order that the latter may at all times remain in perfect mesh with the gears. To this end a double shifting fork K engages with a collar on the sleeve on shaft A. The various shifting levers K are all fixed to a common sliding bar, mounted in bearings in the gear case, and all of the shifting parts move therefore always simultaneously in the same direction and an equal distance. It will be understood that one of the pairs of expanding blocks is located within the clutch drums G and H, and these two drums can be shifted in such a manner that the blocks are either wholly within the drum G or wholly within the drum H; and that the other pair of expanding blocks is located within the drums I and J, and these drums, too, can be shifted so that the expanding blocks are either within the drum I or the drum J.

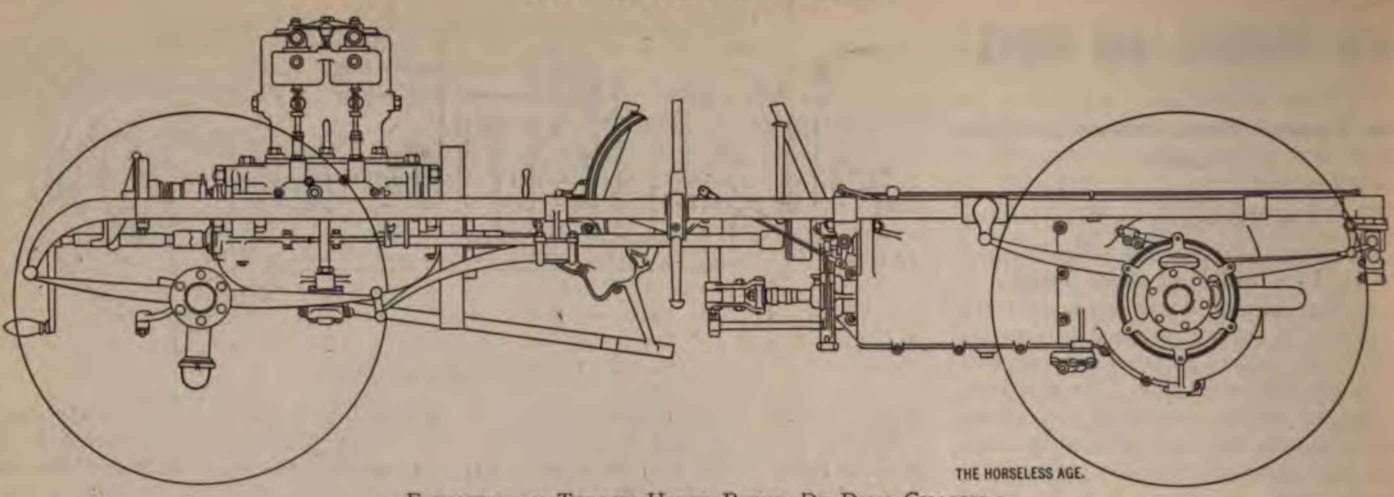


De Dion Change Gear.

In the figure all of the shifting parts are shown in their extreme position to the left and the two pairs of expanding blocks are therefore within the clutch drums H and J, respectively. If now the rack N, which is operated by means of a hand lever convenient to the driver, is pulled out of the shaft B, the expanding blocks within the drum H are caused to grip this drum and thereby lock it and the gear D to the shaft B. The power is then transmitted from the upper to the lower shaft through the gears D, which gives the intermediate forward speed. If, on the other hand, the rack M is forced into the shaft, the expanding blocks within the drum J are caused to grip this drum and thereby lock the gear M to the shaft, thus giving the highest forward speed. All the shifting parts are normally held in the extreme position to the left, which corresponds to the intermediate and highest speed, by means of a coiled spring acting on the sliding bar to which the shifting forks K are attached. When it is desired to engage either the slow forward or reverse gear, the shifting parts must first be brought to the extreme position to the right, against the tension of the spring, which is accomplished by means of a foot lever. Then the clutch drums G and I are over the expanding blocks. By moving the rack N to the left or out of the shaft B, the clutch G is locked to the shaft B and the reverse motion of the car obtained through the gears C. If the rack N is moved to the right, or into the shaft B, the clutch drum I is locked to the shaft and the slowest forward speed obtained through the gears E.



Plan of Twelve Horse Power De Dion Chassis.



Elevation of Twelve Horse Power De Dion Chassis.

This combination possesses a number of advantages. In a practical operation the second and highest speed are mostly used, and to change from one to the other requires only a motion of the hand lever controlling the clutches. On the other hand, when the vehicle is operated in dense traffic in the city it will be running on the lowest gear, and the possibility of engaging the reverse by means of a single positive motion of a hand lever is certainly a great advantage.

Upon the end of the upper shaft will be seen a spiral pinion R, which serves to drive an oil pump for circulating the oil in the gear case, the same as in the case of the engine. C represents the bevel pinion at the end of the lower shaft, which is in mesh with the bevel gear P. L, at the left hand end of the shaft B, is a brake drum. The gear case is formed of three parts, being divided in a plane through the two transmission shafts, and through a plane perpendicular to these shafts, and through the centre of the differential gear.

THE RUNNING GEAR.

The car has a tubular running gear frame and a very elaborate system of suspension. A platform spring is used in the rear, and what might be called a three-quarter elliptic in front. The wheel base is 84 inches and the tread is 50 inches, the total length of the car being 10 feet. The wood artillery wheels are 32 inches in diameter and fitted with 90 millimetre (3.6 inches) tires. The transmission is, of course, entirely chainless, and the gear ratio is varied so as to give a maximum speed of 25 to 30 miles per hour at the option of the purchaser.

The steering is by an inclined hand wheel and irreversible. The steering column is braced by two vertical columns, inside of which are disposed rods for controlling the motor and change gear. In the right hand column are located two rods, one for the carburetor and the other for the ignition gear. Through the left hand column rises the rod or shaft for operating the friction clutches. To the right of the seat is located the lever for operating the hub brakes. Under the left foot there is a pedal for throttling the motor which, when pushed to the limit of its motion, applies the brake on the transmission gear. By pressing with the right foot on the pedal located at the right the shifting parts of the change gear are shifted to the position in which the clutches operate the slow forward and reverse gear. Both of the brakes are claimed to be double acting.

The frame is designed to receive various kinds of bodies—tonneau, limousine, etc.

A New Herschmann Steam Truck.

Arthur Herschmann, of the American Steam Wagon Company, New York city, has entered for the Commercial Vehicle Trials, to be held on the 20th and 21st of this month, with a new 6 ton truck. The platform of this truck is 14 feet long by 6 feet 8 inches wide. The wheels are 40x6 inches in front and 44x7 inches in the rear. The power is transmitted to the rims of the drivers by steel spiders.

The boiler is of the fire tube type fitted with copper tubes. A working pressure of 180 pounds per square inch is carried. A cover over the boiler may be readily removed when it is desired to clean the boiler tubes. Among the attachments may be mentioned a superheater and a feed water heater. Two feed pumps are provided, one a steam pump with condensing arrangement and the other an engine driven pump. The engine is a two cylinder horizontal compound of 4 and 7x7 inches. The transmission gears are of cast steel and bronze, and permit of two different ratios of transmission, reversing being, of course, effected by reversing the motion of the engine. The balance gear is of the spur type, and may be locked by the driver without leaving his seat. This, as is known, is necessary to prevent slipping of the drivers when one of them stands on slippery ground. The wagon is fitted with wheel steering with worm reduction and adjustable joints. The front axle is guided in patented truss brackets. Two double acting foot brakes are fitted.

Herschmann Six Ton Steam Truck.

The water tanks have a combined capacity of 180 gallons, and 500 pounds of coal

e carried. The wagon has no stack produces little or no visible steam, as xhaust steam is discharged into the r flue and is "consumed" by the burnt . All the machinery of the wagon is cted, and the machine is said to be free from noise and shock.

The New Mercedes Cars.

illustrate herewith one of the 1903 20 horse power Mercedes cars, one e first that was brought to England. are as yet none of this type in this ry, as far as we know. The photo s out very plainly the new front axle uction, which is of sectional steel in- of tubular, one of the distinguishing es in the 1903 car from the 1902 l. The speed lever works on a grid- quadrant, and there is little difference e appearance of the car generally, as ared with last year's model. For the of the car we are indebted to Har- on Moore, of London, who is seen at heel in the cut.

1903 Model Twenty Horse Power Mercedes Car.

Motor Car Power Equipment ompany's Motors and Transmission.

print herewith some illustrations of ew Evinrude motor and transmission nanufactured by the Motor Car Power ment Company, of Milwaukee, Wis. notor shown is rated at 7 horse power, s combined with a three speed forward everse planetary gear. Fig. 1 shows view of the motor and transmission ranged for being put under a bonnet front of the car, and for driving the axle by a flexible shaft and bevel gear. shows a sectional view of the motor. outfit is also made for chain driving, ich case the transmission gear is re- d, the friction clutch being placed near ngine, and an outboard bearing being ded at the outer end of the gear.

engine is of somewhat familiar de- but embodies quite a number of novel es. The flywheels are enclosed within rank casing, and the crank shaft is up as in bicycle motors. The crank earing, however, has a removable cap, an be taken apart or adjusted from le the crank case, there being a hand it the front of the crank case which is ed by the name plate, and the flywheel is cut out to allow of reaching the ig cap. The motor is oiled by means itside oil cups, one for the cylinder ne for the bearings. The cup on the f the crank case oils the crank shaft ig, and also the crank pin bearing, gh channels leading through the crank The flywheels are 14½ inches in ter and weigh 80 pounds, and it is ed that the motor can be throttled low without causing it to run with

order to make the motor short and ot sacrifice any wearing surface, the piston is made of such shape that part of it travels down between the two flywheels, causing it to resemble a crosshead. This increases the wearing surface of the lower part of the piston. The wearing surface of the upper part of the piston is reduced by the packing rings, and to at least partially make up for this the head of the piston is made concave. This is well shown by Fig. 3.

The inlet and exhaust valves are of the flat seat type and are large in diameter, the inlet a trifle larger than the exhaust valve. The former has a lift of 3-32 inch, and the latter of 7-32 inch. The exhaust valve has a cast iron head and a steel stem, the head being claimed not to warp or scale and not to need any regrinding. The inlet valve is a single piece drop forging. Both valves are very accessible, the inlet valve housing being fitted into the cylinder independently of the intake pipe, and can therefore be taken out without disturbing the intake pipe connection. The exhaust is let out of the valve chamber at an angle, the exhaust passage being thus as direct as possible. The ignition is of the jump spark type, the plug being fitted into the wall of the valve chamber between the two valves. The mechanical interrupter is fastened to the secondary shaft of the engine, and is claimed to give the same length of con-

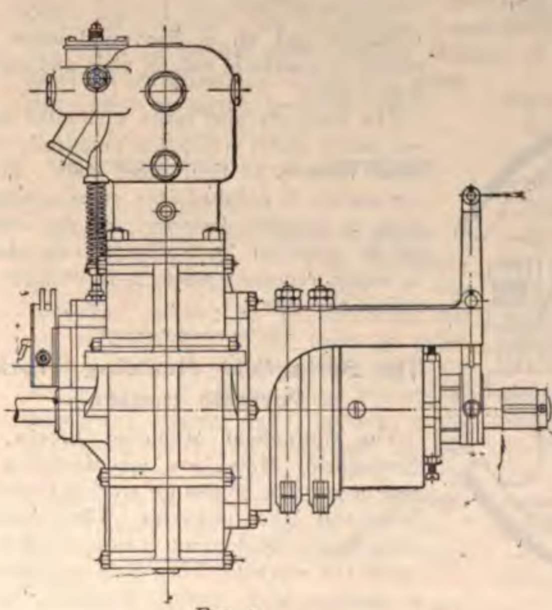


Fig. 1.

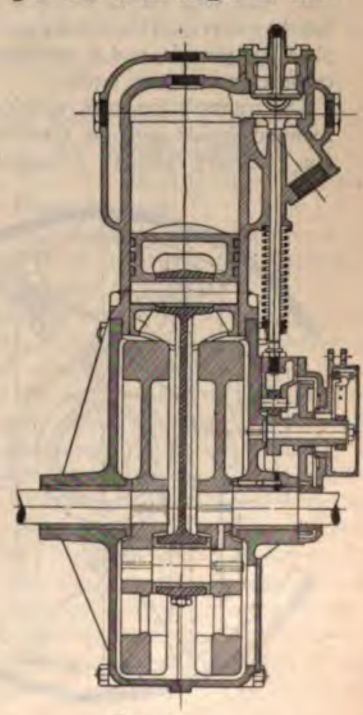


Fig. 2.

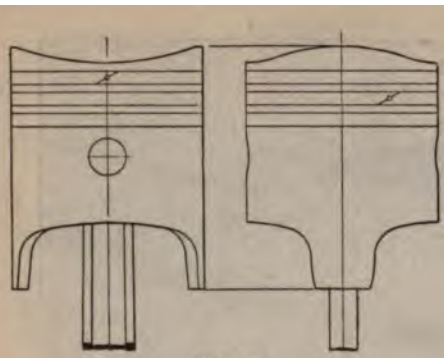


FIG. 3.

tact whether the engine is running fast or slow, thereby saving battery power at slow speeds. [How this can be done without a mechanical governor is not clear to us.—ED.] The contact points are of platinum-iridium. An innovation is made in the location of the compression cock. It is placed in the side of the cylinder, somewhat below the upper end of the piston stroke. In starting, when the cock is open, the charge escapes from the cylinder during the first part of the compression stroke, but is compressed during the latter part of the stroke, from the time that the piston head passes the cock, which is said to result in more certain starting.

The bore and stroke of the motor are both 4½ inches and the compression is carried at 90 pounds to the square inch. The weight of the motor alone is 160 pounds. The cylinder, piston and rings are said to be all ground to fit. No packing is used anywhere on the motor, the cylinder, valve chamber and head being all cast integral. The crank case is cast in aluminum and with brackets for supporting the motor. The company also make a two cylinder motor with separate cylinders of the same size as here described and crank pins at 180° with each other, which is rated at 14 horse power. This motor weighs complete 300 pounds, and is equipped with one carburetor and one muffler.

The transmission gear, which gives three forward speeds and one reverse, comprises six planetary pinions arranged in pairs,

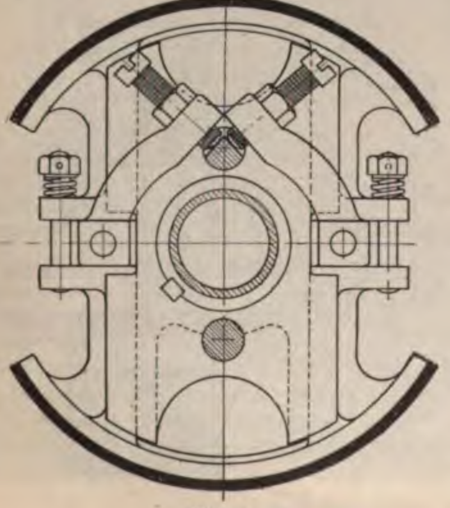


FIG. 4.

and one internal gear. For the high speed the whole gear is clutched together by means of a friction clutch of special design. The pinions are made of hard bronze, and run into steel central gears and an internal gear of cast iron. The transmission has a double clutch and two band brakes. The brake bands are cast and lined with fibre, which is afterward turned down true. They are supported from the bracket of the motor in a substantial manner, and on the opposite side are provided with a clamping arrangement, by means of which and a lever they may be applied to the gear drums. With this system there is no side strain on the bearings of the transmission, and all parts run freely when the brakes are applied. The friction clutch is of the expanding shoe type. Normally the two shoes are held away from the internal clutch surface by two coiled springs on studs passing through brackets on the two shoes respectively. Between these two brackets are located square cam parts, which, by means of arms and a shifting cam rod, can be slightly rotated around their axes, and thereby be caused to spread the shoes and force them in engagement with the clutch drum surface.

American Machine Manufacturing Company's Coils.

The American Machine Manufacturing Company, Boston, manufacturers of the "Perfection" spark plug, have added a line of ignition coils. The coils are made with buzzers or magnetic vibrators which have a long range of adjustment. The coils may be worked either with or without the vibrators, and the latter are automatically cut out when the speed of the motor exceeds a certain point.

This method of operating the coil—as a vibrator coil at low speed and a plain coil at high speed—gives a hot spark in starting the motor and is economical where dry batteries are used.

These coils are made for any number of cylinders, put up in hardwood cases of cherry or quartered oak, in plain and dashboard styles.

The company also make a vibrator coil for motor cycles which has practically the same features as their other coils. They are put up in polished fibre cases 7 inches long by 3 inches diameter, and the vibrator is protected by a vibrator cap, which is easily removed when it is desired to adjust the vibrator.

The Springfield Moulding Works' Portable Houses.

The Springfield Moulding Works, of Springfield, Mass., are manufacturing a line of portable houses for storing automobiles and other purposes. Their houses embody several departures from those now upon the market. They have substituted a concrete, brick, asphalt, macadam, cinder or dirt floor for a wood floor, which soon rots out. Machines can be washed in houses of this construction without fear of rotting the flooring, and there is no danger of breaking the flooring under the weight of heavy machines.

These houses are made on the unit system, but put up with as few pieces as possible. The roofs are covered with a patent heavy duck, chemically prepared, which will last twice as long, it is claimed, as canvas, and will continue to be absolutely water tight. All houses 11x14 feet or less are built with one section for each side of the roof and capped with an ornamental ridge. The seams are all double lapped joints with no exposed nails. When finished it is painted with pure lead and oil (two coats). The doors are hung with heavy wrought iron hinges, put on with bolts, and can be made to swing out or in, as desired. All houses are primed one coat outside at the factory.

New Incorporations.

Waldorf Motor Car Company, of New York; capital, $10,000; directors, G. C. Peckham, H. F. Doris and R. F. Katz, all of New York city.

Standard Automobile Company, of New York; capital, $5,000; directors, C. F. Wyckoff, of Ithaca; J. R. Chisholm, of New York; E. H. Frederick, of Newark, N. J.

Moakler Automobile Company, Washington, D. C.; incorporators, John M. McClintock, Wm. C. Dashiell, John J. Melligan, John W. Moakler and Alfred Gould.

The Orange Automobile Exchange and Manufacturing Company, of Newark, N. J.; capital, $50,000; incorporators, George J. Althen, B. A. Durham and R. Arthur Heller.

Lewis Auto Company, of New York, to manufacture automobiles; capital, $1,000; directors, Lewis M. Bloomingdale and Leo Jacobson, of New York, and Charles D. Clark, of Brooklyn.

United Motor Corporation, Portland, Me.; for manufacturing automobiles; capital stock, $500,000; president, C. H. Wheelock, of Dorchester, Mass.; treasurer, W. E. Pratt, of Brockton, Mass.

The South Broad Street Automobile Company, of Philadelphia, Pa.; capital, $5,000. The officers are as follows: R. C. H. Brock, Wharton Sinkler, G. C. Heller, of Philadelphia; Charles H. Brock, of Wyncote and Horace Brock, Arthur Brock and John Penn Brock, of Lebanon.

Fall of a Motor Bicyclist at High Speed.

While attempting to lower the record on a high powered racing motor cycle on the Parc des Princes track on April 16, a well known rider named Sigonnaud had a side slip on the banking and fell. He was traveling at 71 miles an hour at the time. The man and machine were hurled several yards, but fortunately fell on soft grassy ground and miraculously escaped practically uninjured.

COMMUNICATIONS.

How a Multiple Cylinder Gasoline Engine May Reverse.

Editor HORSELESS AGE:

I want to ask if you can explain to me how it is possible for a gasoline automobile motor to run backward. A number of persons were examining a newly imported French four cylinder car the other day, and the motor had been repeatedly started and stopped by switching the spark current on and off. One was "monkeying" with the spark advance and left it with quite a long lead. The current was then switched on by another, when the motor started to run backward. As the bonnet was off, the fan inside the cellular cooler was visible, showing direction of rotation, and he instantly switched off the current in great alarm, but as the circuit breaker was in the form of brushes on a smooth commutator, there was nothing to catch, and no harm was done.

Now, as the cam shaft could not shift position, it seems that the exhaust valve would be open only when the piston was making its down stroke, which would not be the proper time to clear the cylinder of spent gases. Let us assume that one cylinder had stopped just before completing its compression stroke. The spark occurring then would of course drive the piston down, but when the crank passes the centre the exhaust valve does not open, and the piston must rise against the full volume of spent gas. Another cylinder explodes at this instant, and perhaps would give power enough to compress the burnt gas in No. 1 cylinder, and force the latter up past the top centre, when its exhaust would at last open, and No. 1 would be cleared while No. 3 was exploding, and continuing the motion of the engine. At the bottom centre the exhaust would close, No. 4 would explode, and No. 1 piston would rise in a compression stroke, but with nothing to compress except a very little spent gas. No. 1's spark would then occur, but with nothing in the cylinder to explode, and as the piston went down a new charge would at last be sucked in; at the bottom centre there should be no explosion, as no charge is in No. 2, but the flywheel would would carry through the compression stroke. At the top centre No. 1 would be ready to explode, but there would be no spark, and no explosion in No. 3 cylinder either. The flywheel would then have to carry the engine another full revolution against the compression of all four cylinders in succession (though possibly the charge in one cylinder on its down stroke would equalize the compression in another on its up stroke), before another explosion could be had.

I guess I have answered for myself the question with which I started. It seems the engine could make two full revolutions with four explosions, then two full revolutions with no explosions at all, then repeat. After all, it is only a question of flywheel enough to carry through the two idle revolutions, and on the first of these some of the cylinders would be empty—nothing in them to compress—while at the end one cylinder full of gas would be balancing another which was compressing. It almost looks as if the self starting and self reversing engine were nearly accomplished, for this motor very seldom fails to start on spark, and is said to have done so after standing over night. The workmanship on piston rings and valves must be most admirable.

R. W. B.

Explosive Engine Query.

CHESTER, Pa., May 13.

Editor HORSELESS AGE:

Will you kindly answer the following questions: Has the explosion in a gasoline motor any expanding force left after the power stroke? We will take for instance a motor with 4 inches bore and 5 inches stroke, with spark advanced 1-16 inch. Would the explosion at the end of the power stroke have expanding force left to drive the piston farther if the stroke was longer? If so, could power be derived from it until the pressure became equal to atmospheric? Will the gases expand like steam?

H. G.

[The gases in a gasoline engine cylinder at the end of the power stroke have expansive force left, their pressure at that point being usually somewhere around 50 pounds per square inch, when the cylinder draws in a full charge. Additional power can be obtained by further expansion, or by making the expansion stroke longer than the admission stroke. Theoretically power would be given off until the pressure had become equal to atmospheric, but there would be no practical gain after the excess of pressure over atmospheric was less than the friction of the piston. The gases expand essentially the same as steam, particularly at higher pressures.—ED.]

Universal Joints—A Correction.

Editor HORSELESS AGE:

When reading Mr. Heldt's article in the current number of THE HORSELESS AGE, entitled "Universal Joints," I was somewhat amused to be informed that the arrangement of the forks on intermediate shaft, shown in his Fig. 6, is the proper way to obtain equal velocity of driven and driving shafts, in view of the fact that the text books show and my own experience has demonstrated it to be the wrong way; as it must necessarily increase "the variation caused by the first joint," and not "always exactly compensate" such variation.

On page 402 of present volume, Figs. 2 and 3 show this same arrangement, and it is the Unwin form of joint, too. And that reminds me that some twenty or more years ago I had a small double joint of that form made for a cam cutting machine. The forks of the intermediate shaft were not set as Mr. Heldt now tells us they should be set, but parallel, i. e., in the same plane, and yet it was a great surprise to many to see the way that intermediate shaft wobbled around whenever it was set at any great angle to the other shafts.

Without the mathematical formulæ it can readily be seen that were the intermediate shaft of the double joint, as usually constructed, the driver of the other two shafts, its forks must be located alike (in the same plane) to impart equal velocities to the other shafts, and even then it may not always do so unless the said two shafts are so located that each one of them lies at exactly the same angle to said intermediate, not necessarily parallel, as Mr. Heldt states.

I once saw two lines of shop shafting connected by arrangement of forks similar to Mr. Heldt's Fig. 6. There was only one length of shaft with one pulley thereon attached to one end of the joint, and yet it shook things up so that it was only a question of how quickly could the engine be shut down and my advice taken to disconnect and turn one of the forks on intermediate shaft just ninety degrees, and for aught I know it is still running.

Mathematical formulæ for double joints are given quite fully in "Weisbach's Mechanics of Engineering and Machinery."

CHARLES E. CHURCH, M. E.

[Our correspondent is correct; the forks at the opposite ends of the intermediate shaft should be located in the same plane, and the Fig. 6 in the article on "Universal Joints" is wrong. This does not affect the equations given in that article, as they only refer to the variation of speed due to a single joint. We wish to express our thanks for the correction.—ED.]

Touring Route from Ligonier, Ind., to Toledo, Ohio.

BRYAN, Ohio, May 12.

Editor HORSELESS AGE:

In your last number you reply to a letter from W. E. Hinchey and give a route from Milwaukee to Buffalo.

Regarding that portion of the route from Ligonier, Ind., to Toledo, Ohio, I have to say that you do not give the best route. Part of the route named would be almost impassable except for high powered machines on account of the sand. Much the best route is as follows: Ligonier, Wawaka, Brimfield, Kendallville, Waterloo, Butler, Edgerton (Ohio), Bryan, Stryker, Archbold, Wauseon, Delta Swanton, Toledo. The above route contains no sand roads and only about 15 miles of clay, which is good in summer. The balance is well graveled. I am sending you a blue print of this road which I will be pleased to furnish to others who may want information regarding this locality. Parties go-

ing from Chicago to Cleveland can save time by going to Toledo rather than the Napoleon, Bowling Green, Fremont road which you mention, as it is always bad and usually very bad.

WILL W. MORRISON.

Wants to Boycott Long Island Farmers.

Editor HORSELESS AGE:

Was not this bill made by Long Island farmers? Is the automobile class large enough to repay them by refusing to buy or use Long Island supplies? Would such a repayment be practicable? I am summering in a Long Island town and am considering refusing to buy any table supplies or stable supplies here, giving the men the reason. I could get everything from the city, and with some trouble could, I suppose, see that I got everything from up the State.

Would this idea do any good. I want to hurt the Long Island farmer in some way.

H. H. W.

[We do not believe the idea will work, because potatoes, cabbage, etc., do not bear any trademark, and how is a New Yorker to know whether his grocer draws his supplies from Long Island or from New Jersey? Besides, the bill was voted for by members of the Legislature from all over the State, showing that there is no special reason to favor the up State farmers at the expense of those on Long Island. Boycotting the farmers in certain sections of the State will do little good in the way of paving the way for a more lenient measure. Our advice is to use caution in driving, and so convince the people that there is no need of harassing restrictions.—ED.]

A. C. A. Affairs.

There will be a club run on Decoration Day, May 30, to the automobile race meet at the Empire City Track, Yonkers, N. Y. The run will start from the clubhouse at 12 o'clock noon. The route will be through the park to 110th street, Seventh avenue to Central Bridge and thence via Jerome avenue to the track at Yonkers avenue. The house privileges of the Empire City Trotting Club will be extended to the members of the Automobile Club of America, and clubhouse tickets for those participating in the run can be obtained from the Automobile Club secretary. Luncheon will be served in the clubhouse at the track. The first race will start at 2 p. m.

Commercial Vehicle Contest.

The contest committee of the A. C. A. on May 13 announced that an extra class had been added, viz., a miscellaneous class, comprising vehicles of any weight, to carry a dead load of at least 50 per cent. of their weight, including fuel and supplies; medals to be awarded upon the same conditions as in the other classes.

Non-penalized stop of forty-five minutes for lunch will be made at the end of the first stage each day.

ROUTES OF THE CONTEST.

The two maps shown herewith give the routes in New York city that will be pursued by the vehicles in the Commercial Contest.

For the first stage the route will be from the clubhouse, Fifth avenue and Fifty-eighth street, through Fifty-ninth street to Central Park West, to 110th street, to Amsterdam avenue, to King's Bridge road, to Broadway, to 230th street, returning through Bailey avenue, Sedgwick avenue, Jerome avenue, Seventh avenue, 135th street, Fifth avenue, Eighty-sixth street, Park avenue, Seventy-ninth street and Fifth avenue, to the clubhouse.

For the second and third stages the route will be from the clubhouse down Fifth avenue and Broadway to Battery place, to West street, to Laight street, to Canal street, to Broadway, to Fifth avenue, to the clubhouse.

Trade Literature Received.

Automobile Material, Parts and Supplies.—A. L. Dyke Automobile Supply Company, 1402 Pine street, St. Louis, Mo.

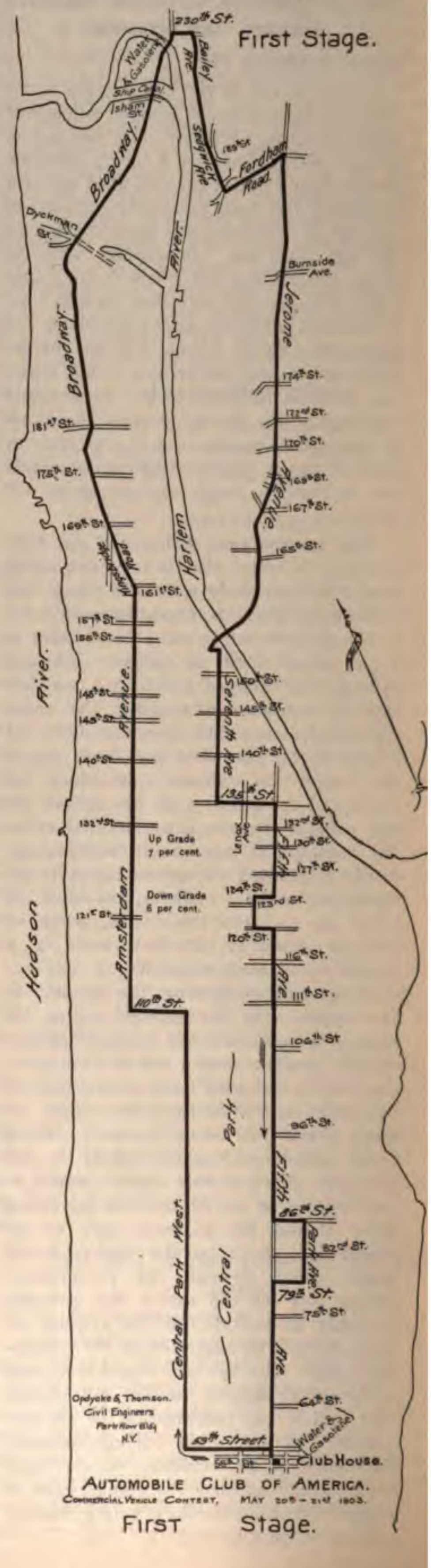
The Holsman Automobile.—The Holsman Automobile Company, 153 Lasalle street, Chicago, Ill.

Schilling Gasoline Engines.—C. R. Schilling, 110 South Third street, St. Louis, Mo.

"Motor Lostwagen" (Motor Goods Wagons).—Neue Automobile Gesellschaft, Berlin N. W., Louisen str. 29.

The Spider, Bull's-Eye and Sextet Multiplex Lubricators.—The Automatic Lubricator Company, of 334 Dearborn street, Chicago.

Portable Houses for Automobiles, etc.—The Springfield Moulding Works, Springfield, Mass.



...OUR... FOREIGN EXCHANGES

Automobile Novelties at the Annual Exhibition of the Societe de Physique.

A PHOTOGRAPHIC SPEED MEASURING APPARATUS.

Among the numerous new instruments shown this year at the annual exhibition of the Société Française de Physique, which opened at Paris on April 17, was an apparatus built by the firm of Gaumont & Cie., and which permits of obtaining a positive record of the momentary speed of an autombile. This instrument consists of a camera provided with a screen with two narrow windows, separated by a space of several centimetres. Upon the base of the instrument is located a tuning fork, which

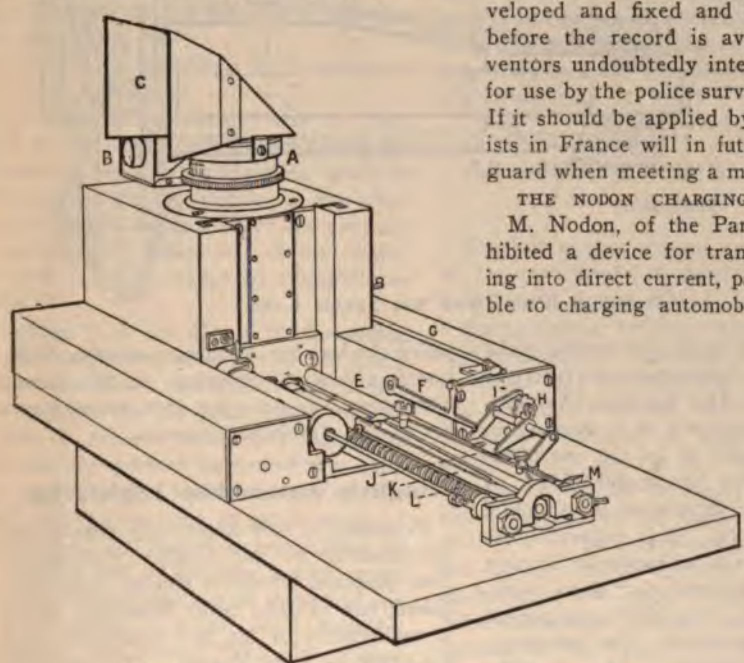


FIG. 1.—GAUMONT SPEED MEASURING APPARATUS.

A, lense; B, sighting glass; C, total reflection prism with sunshade; D, speed regulator; E, stem of tuning fork; F G, tripping lever of tuning fork and shutter; J, bar carrying the tuning key; K, tuning fork; L, spring for setting tuning fork in motion; M, pawl for the tuning fork system.

is set in vibration by the same mechanism that operates the shutter of the camera. A dry plate, measuring 8x16 centimetres, is used, and is divided into two equal parts, 8x8, upon one of which are photographed the vibrations of the tuning fork and on the other two images of the car. The wave line representing the tuning fork vibrations is interrupted at two points corresponding to the moments when the images of the car are taken. From these photographs and the wheel base of the car the momentary speed of the latter can be calculated as follows:

Let W be the length of the wheel base in metres; w, the length of the wheel base on the photograph in mm., and d the displacement between the two images on the plate. Then the distance actually traveled by the car in the time between the two images were taken is $\frac{W\,d}{w}$ metres.

Also, let t be the time of one period of the tuning fork in fractions of a second and n the number of periods registered; then the time between the two images is equal to $n\,t$ seconds. Therefore, the speed of the car is:

$$\frac{W\,d}{w\,n\,t} \text{ metres per second,}$$

$$\text{or } \frac{3.6\,W\,d}{w\,n\,t} \text{ kilometres per hour.}$$

It will be evident that a deviation from parallelism between the course of the car and the photographic plate will not affect the result, as the length of the wheel base on the plate and the displacement of the car on the plate will thereby be reduced in the same proportion.

Although the device is not without some evidence of ingenuity, its utility is somewhat doubtful, as the plates have to be developed and fixed and impressions made before the record is available. The inventors undoubtedly intend the instrument for use by the police surveilling auto traffic. If it should be applied by them automobilists in France will in future have to be on guard when meeting a man with a camera.

THE NODON CHARGING TRANSFORMER.

M. Nodon, of the Paris University, exhibited a device for transforming alternating into direct current, particularly applicable to charging automobile batteries. The instrument is called an electric valve, and is said to have proven quite successful. It comprises four cylindrical containing vessels or cells of insulating material into which are introduced from below two concentric electrodes separated from each other by an insulating stopper. The inner electrode in the form of a rod is composed of an alloy of aluminum and zinc, and the outer electrode in the form of a tube with perforations is of iron. The cell is filled with a saturated solution of ammonium phosphate. As will be divined, the cell acts upon the same principle as the aluminum electrolytic rectifier. When the current passes in the direction from the rod to the tube a thin layer of oxides and phosphates of zinc and aluminum is formed on the surface of the rod, almost instantaneously. This layer is

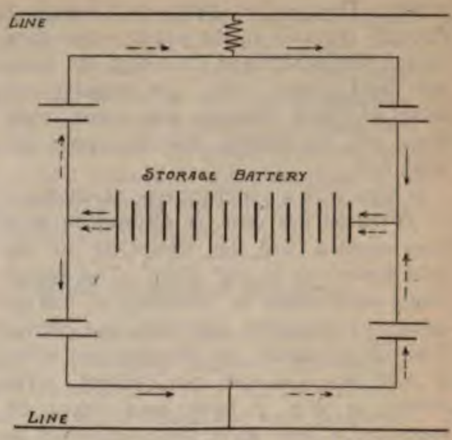


FIG. 2.

of such high electrical resistance that it practically cuts off the current until the direction of the latter is reversed. The reverse current instantly reduces the high resistance compounds forming the layer, and flows freely through the cell.

The object of using four cells is to use the impulses in both directions, and this is accomplished by means of the arrangement shown in Fig. 2. The cells are connected across the line carrying the alternating current in two parallel rows, the points of attachment for the two rows being identical. The two cells in each row are connected oppositely, and no impulse could, therefore, flow through either of these "rows" either way. The battery to be charged is connected between the two cells of either row, and this gives a free passage across the line for both impulses of a

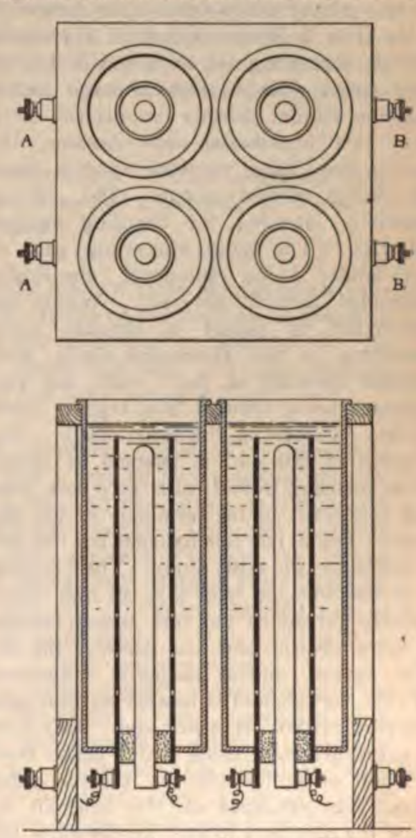


FIG. 3.—NODON ELECTRIC VALVE.

A, alternating connections; B, continuous connection.

period. The positive impulse will flow, say, through the cell at the upper right hand corner, the battery and the cell at the lower left hand corner, while the negative impulse will flow through the lower right hand cell, the battery and the upper left hand cell.

In tests with a 5 ampere type an efficiency of 75 to 80 per cent. is claimed to have been reached, and the electrolyte of the cells heated up to 104° Fahr. The experiments were made in charging a storage battery of forty-two cells with line current from the city mains, the frequency of which is forty-two reversals per second. The curves in Fig. 4 have been taken by means of a new wave tracer invented by Professor Hospitalier, known as the ondograph. Curve 1 shows the alternating pressure of the line to which the converter is connected, curve 2 the current supplied to the converter, curve 3 the current sent into the storage battery, and curve 4 the pressure at the storage battery terminals when the apparatus is in operation.

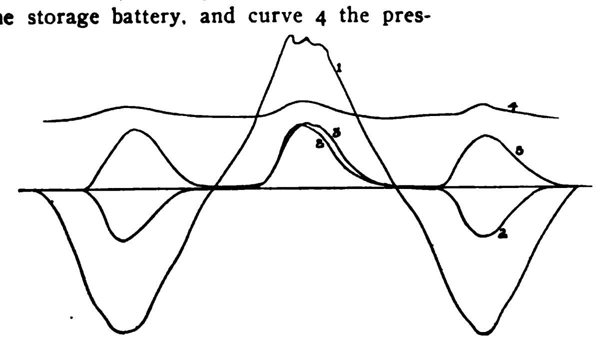


Fig. 4.

DE DION ELECTRICALLY CONTROLLED THROTTLE.

De Dion & Bouton exhibited a portable electric generating set composed of one of their single cylinder, vertical water cooled gasoline motors directly connected to a two pole Manchester type dynamo, the combination being mounted upon a truck for being moved about. The set is especially intended for charging storage batteries. The most interesting part of the outfit is an automatic, electrically controlled throttle governor. Within the carburetor is placed a throttle valve consisting of two cylindrical shells with circular openings in their walls, the two openings being brought into register more or less by rotating the inner shell. The rotation of this part is effected by means of a solenoid wound with very fine wire and connected to the terminals of the dynamo. For a 110 volt dynamo the coil has a resistance of 2,000 ohms. The solenoid is of the ironclad type, i. e., an iron shield entirely surrounds the coil, which renders it more efficient and also protects the device against outside magnetic influences. Within the solenoid is located an iron core tapering toward its lower end. This core is suspended by a chain which passes over a wheel or pulley on the throttle valve stem. The tendency of the solenoid to draw the core into it and thereby close the throttle is counteracted by a flat spiral spring which tends to open the throttle. The fixed end of the spring is adjustable, and this admits of setting the regulator to maintain any desired voltage.

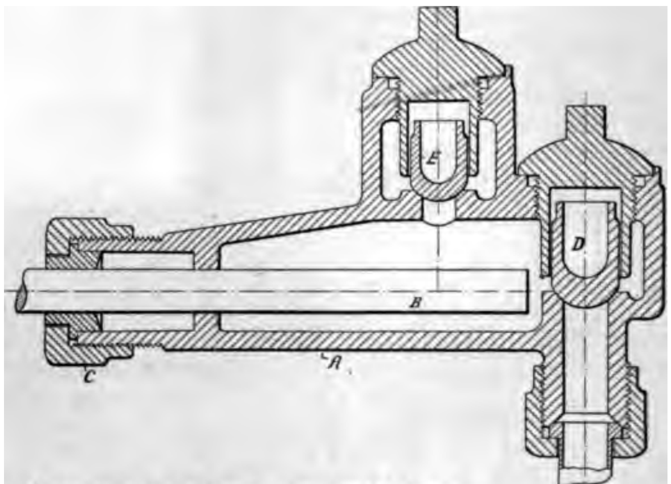
Amalgamation of Bavarian Automobile Clubs.

Bavaria is not a paradise for automobilists at present. Many cities and towns exact from the passing tourist (as well as from the local auto owner) a "pavement toll," and in some places every would be chauffeur must pay the authorities an examination fee of $6. This unfavorable attitude of the local authorities has led, among other things, to a movement for the amalgamation of the various automobile clubs in the kingdom to better guard the interests of automobilism. The Bavarian Automobile Club was organized at a meeting in Nuremberg on April 18 by the consolidation of the Munich Automobile Club, of Munich, and the Frankian Automobile Club, of Nuremberg. It is expected that several other clubs in existence in Bavaria will also join. The new club is to be divided into sections, each of the component clubs forming one section. The headquarters of the new club are in Munich. The business year corresponds with the calendar year. General annual meetings will be held in November or December of each year. Each of the sections will appoint one member of the executive committee for every fifty members and every subsequent fifty begun.

At another meeting on April 20 the following temporary officers were elected: President, Professor Poehlmann, Munich; vice president, Director Schuette, Nuremberg; attorney, Dr. Kuehles, Munich.

Novel Feed Pump for Steam Cars.

On the Chaboche steam cars manufactured in France a novel engine driven feed pump is used which is designed to avoid air and steam being pocketed in the pump and thus interfere with its operation. The pump is arranged horizontally, and the pump barrel A is made considerably larger in diameter as the plunger B, the latter being guided in a stuffing box with cap C. The valves are of a peculiar cup shaped kind with spherical seats. The suction valve D is located at the end of the pump barrel, and the discharge valve E on top the barrel. The water passes through both valves from below and out laterally, and the tops of the valve chambers are closed by threaded plugs which are hollowed out to serve at once as guides for the valves. It is claimed that owing to the arrangement of the discharge valve on top of the pump barrel and the peculiar shape of the latter, any air getting into the pump barrel, or any steam formed therein, will at once be expelled through the discharge valve, and not interfere with the working of the pump. The pump was described in a recent number of the *Automotor Journal.*



Chaboche Feed Pump for Steam Cars.

English Automobile Legislation.

Proposals of new automobile regulations are brewing in the English Parliament. Two proposed bills have recently been published, one by John Scott Montague, being a modification of his last year's bill, and the other by Lord Russell. The most important sections of Mr. Montague's bill are Sections 1 and 5, which read as follows:

After the commencement of this act any person driving or in charge of a vehicle as herein defined on a public highway shall, unless some person is registered owner thereof, and unless such vehicle bears thereon a number or such other mark of identification as may be prescribed, be guilty of an offense punishable summarily.

The rate of speed at which a light locomotive may be traveling shall not, irrespective of the other circumstances of the case, be a ground for taking proceedings or imposing fines or penalties against the owner or person in charge thereof.

Lord Russell's bill is in some respects more severe. Its chief sections are as follows:

3. (1) Every light locomotive shall be required to carry a metal plate not exceeding in length 7 inches, and not exceeding in width 3 inches, upon which shall be

y engraved or inscribed a distinguish-
tter and number.
The council of each administrative
y shall make provision for the supply
demand to an owner of a light loco-
e of a metal plate as aforesaid bear-
distinguishing letter and number, and
keep a register of such plates, and of
ames and addresses of the persons to
they were issued.
The council may charge a sum not
ding 5s. for each plate supplied.
The driver of every light locomotive
be furnished with a certificate of com-
cy after an examination, subject to
for such examination and regulations
ying the terms upon which such cer-
e may be held to be framed by the
government board, who may delegate
any of their powers under this sec-
to the Automobile Club of Great
n and Ireland.
rules and regulations shall provide
alia:
That the charge for such certificates
not exceed 10s.
That the certificate shall remain in
until cancelled.
That the certificate may be can-
by the local government board for
ess driving, for drunkenness while in
e of a light locomotive, or for other
s which in the opinion of the examin-
body render the holder of the certifi-
unfit to be in charge of a light loco-
e.
May 5, in the House of Commons,
Ellis asked the president of the Local
rnment Board whether he would take
to place the law with respect to mo-
ars on a more satisfactory footing by
ving the present hard and fast limit
speed, subject to due security for the
y and convenience of other users of
c roads, by requiring registration of
ehicles, and by enacting a high maxi-
penalty for breaches of these and any
conditions it might seem desirable
npose. Mr. Long: "Yes, sir. I have
eparation a bill dealing with this sub-
and I hope shortly to be able to in-
ice it."
e House of Commons is promised a
ral debate on the motor car question.
neth Balfour gave notice on April 27
he intends to obtain the opinion of
House on the questions of the speed of
r cars and the responsibility of mo-
ts. Mr. Balfour's exposition of his
tions was so prolix that he was called
der by the Speaker. In the House of
s also the subject of motor legislation
ought up at intervals. At a recent
on Lord Lamington asked the Gov-
ent for a return of cases reported to
police since January 1, 1902, in which
y was caused to the person or proper-
the public by motor cars, other than
accidents in which the occupants of
cars were alone injured. He said that
he most part motor cars were not em-
ed for commercial purposes, and their
was merely a branch of sport indulged in on the public roads at considerable risk to the public, and certainly at great detriment to the public convenience and comfort. When the public roads were built there was no anticipation that they would be used for traffic of this sort, and the number of accidents that had occurred was decidedly large. Simple numerical comparisons between accidents from carriages drawn by horses and from motor cars were misleading, because the number of carriages drawn by horses was very much greater than the number of motor cars.

In the postal vote of the A. C. G. B. and I. upon the legislative question a third question has been added, to give consideration to the proposals of Lord Russell, as follows: Are you willing, in exchange for the removal of the specific speed limit, to consent to the following additional restrictions?: (a) Small and inconspicuous identification plates; (b) certification of drivers; (c) an increase of the penalty for automobilists guilty of serious offenses, such as giving false names and addresses or endeavoring to avoid identification after causing an accident.

An Austrian Deputy on Automobiles.

The following discourse on automobiles by Deputy Silberer, of the Lower Austrian Legislature, is reported in *Automobil Welt:*

Automobilism today pursues an entirely wrong direction. As long as automobiles are made only to satisfy the extravagances and whims of certain wealthy and high standing gentlemen; as long as the safety of the streets and the lives of pedestrians are threatened by the mad speed of the automobiles careering upon them, so long this form of automobilism can not calculate on any encouragement. This speed madness, which only recently again in Nice demanded another victim, is very harmful to the cause. He (the speaker) had been reproached for opposing automobilism, as he was interested heart and soul in every other sport. He had really no liking for automobilism, just because it really could not be considered a sport. By sport was understood bodily exercise and healthy movement in good, fresh air with the greatest possible saving of the nerves. But what happens during an automobile trip? People sit for hours and even days in a crouched position, immovably upon their seats, swallow a lot of dust and ruin their nerves, because they know that at the mad pace they are every moment exposed to fatal dangers. What would a cavalier ten years ago have said if he had been expected to become a locomotive engineer? No doubt he would have laughed at the person making such a suggestion. And yet how much cleanlier is the trade of the locomotive engineer than that of the chauffeur. He is protected in front by the wall of the locomotive, enjoys fresh air and is free to move about on his platform. In conclusion the speaker mentioned that when automobilism should start out in a healthier direction certainly everybody would lend it his aid and encouragement, but as long as the senseless scorching remained in fashion he would have to oppose it and demand of the authorities that they protect the life and safety of the people in this particular, too.

Parade of Steam Wagons

The Thornycroft Motor Wagon Company, of Chiswick, England, arranged a May Day parade on the Thames Embankment between Westminster and Waterloo bridges, from 8 to 9 a. m. The parade included twenty-five Thornycroft wagons, five Leyland wagons and one Straker. The event was in the nature of a competition, prizes being awarded on the score of cleanliness of boiler and mountings, of gear, state of lubrication of gear, and for the general cleanliness of the wagons, consideration being given in allotting the awards to the period for which the vehicles had been in use. Prizes were awarded as follows: First, to a Whiteley furniture van, manufactured by the Thornycroft Company; second, a van and trailer belonging to Searcy, Tansley & Co., built by Thornycrofts, and, third, a lorry belonging to Dewar's Whisky Company.

The weather was not very favorable, but before the rain started in, at 9 o'clock, the parade had been reviewed by the judges. The affair was pronounced a success and it has been decided to make the parade an annual fixture, under the auspices of the Automobile Club, when general prizes will be offered, open to all makes of heavy vehicles.

Mr. Marconi, of wireless telegraphy fame, is a candidate for membership to the A. C. G. B. and I.

During the first three months of 1903 the French exports of automobiles amounted to $2,203,400, compared to $966,400 for the same period last year and only $548,000 during the same period in 1901.

The Norfolk (England) Automobile Club had a run to and meeting at Yarmouth on Saturday, April 11. A police trap had been installed along the road, and as a consequence there were ten "motor cases" before the Blofield Petty Sessions on April 27. The fines imposed ranged from £1 to £2 12s.

Two recent county court decisions in cases in which it was contended that horses which shied at motor cars did not come up to the warranty that they were quiet to ride and drive go to show that the status of the motor as a legal entity is meeting with tardy recognition, says the *Country Gentleman*. At Godalming Judge Russell held that a horse which will not

pass a motor without shying cannot be said to come within the terms of such a warranty. At Norwich a plaintiff who sued for damages because a horse bought under similar conditions shied at the electric street cars also won his case.

The King of England during his recent visit in Paris ordered a 24 horse power Darracq double phaeton. The body is covered and has curved side glasses.

The 100 or 120 horse power Gobron-Brillie car, which we illustrated recently, has four cylinders of 5½ inches bore and each with two pistons, the combined stroke of which is 8.6 inches.

The Prince of Wales has ordered an electric brougham. This is his third motor carriage. His first choice was an electric phaeton for country use, and the second a gasoline driven touring car.

The touring section of the Paris-Madrid race started duly on May 14. The number of entries for this section attained fifty-eight, but only a little over forty started the first day from the Place de la Concorde, Paris.

Tenders for gasoline motor wagons, with a speed of 10 to 12 miles per hour, and capable of dealing with a ton load, are to be invited by the city of Westminster (England) authorities for dealing with the removal of street sweepings.

A proposal has been put forward to organize an electric system of transport on the northern shores of the Black Sea, between the towns of Noworossiisk and Ssuchum. The cars are to be electrically driven from overhead wires, but run on the road and not on rails. It is intended to provide electricity for the system by water power.

A bill for organizing a railless trolley service between Stroud and Cheltenham, England, similar to that in use in Saxony and at present proposed for Liverpool, is being promoted in the House of Commons. One of the conditions to be attached to the bill is that private vehicles shall be permitted (on terms) to take current from the line. It is suggested that meters be employed for measuring the energy thus taken.

The Eastbourne (England) town council on May 1 decided to buy a public motor 'bus now running in that town and three others of the same kind (Milares-Daimler). The chairman of the finance committee (Councillor Towner) proposed that application be made to the Local Government Board authorizing the council to borrow money for the purchase of four cars, and also £200 for a shed in which to house them at Roselands.

On May 3 a hill climbing contest was held on the Exelberg, near Vienna, by the Austrian Automobile Club. The course was 2.6 miles long with an average gradient of 9 per cent. The best time was made by Georg Opel on a Darracq and Hieronymous on a Spitz, the two tieing in 5m. 32 2-5s.

At a recent meeting of the Hotchkiss Ordnance Company, of England, the chairman, C. F. Parsons, stated that owing to the rapidly growing tendency to arbitration, the chances of a large war were becoming fewer. Hence the directors of the company had decided to undertake the manufacture of high class motor cars.

A new automobile club has been formed at Nice, France, under the name of Motor Club of Nice. The new club proposes to encourage the practical development of automobiles by studying the best means for simplifying and strengthening the power mechanism of automobiles without seeking to make speed the foremost quality.

The motor cycle has its place in military work. On fairly good roads it is an ideal means of rapidly conveying orders and information. It has also other uses. For instance, in the recent Easter cyclist manœuvres near Windsor, England, the Twenty-sixth (Cyclist) Volunteers had a motor cycle harnessed to their machine gun, and rushed it about the country at a surprising rate of speed.

Acting upon the representations of the Society of Motor Manufacturers and Traders, the commissioners of the London police have notified the society that in future they do not propose to limit the quantity of gasoline carried on public service vehicles, provided it is so stored as to afford the greatest possible protection to the public from accidental ignition, &c.

Already hotel prices in Dublin and neighborhood have gone up to high figures for the race week, and most of the leading places are fully booked. Householders in the neighborhood of the course are asking exorbitant rates. The price for the use of one room on the night of July 1 in a small house near the route was £5, and prices up to £10 have been demanded for almost similar accommodation.

Considerable annoyance and trouble have been caused to motor car users in England recently by the excessive density of the gasoline supplied by certain firms. It is said that instances have occurred of gasoline motors failing to give their full power. Upon investigation it was discovered that the fuel had a density of .720 and .730 instead of .680. Such gasoline gives endless trouble by causing a thick deposit in the carburetors.

In the annual "control" meetings of the reserves of the German army this year those among the men who are owners or drivers of automobiles are requested to make a statement to that effect. The German military authorities evidently appreciate the possible uses of automobiles in military work.

In the Court of King's Bench, London, a decision has been rendered on the responsibility of owners for the negligence of their chauffeurs in the case of Captain Nicholl against Hon. Robert Beresford for injuries caused by the latter's chauffeur while riding on a motor bicycle. It was admitted that the chauffeur was on the wrong side of the street, but Beresford repudiated liability because the chauffeur was driving the car on a visit to his own friends without Beresford's permission, and that consequently the chauffeur was not in his employ. The jury, nevertheless, gave a verdict in favor of Captain Nicholl for £150, and the court upheld the verdict.

The English team for the Gordon Bennett motor race, Messrs. Edge, Jarrott and Stocks, will be quartered before and until the race at Castle Rhebanhouse, Athy, which has been taken by Mr. Edge from June 7. The Carlow County Council has authorized the expenditure on road improvement in the county of such grants as the Automobile Club may make for the purpose, and has itself made a grant of £125 for steam rolling, subject to the grant of an equal sum from the club. At the Athy Petty Sessions, April 30, it was announced that the local magistrates had agreed that it would be dangerous and undesirable to issue any occasional drinking licenses on the day of the motor race.

A meeting of a provisional committee of the proposed Ladies' Automobile Club was held on April 30 at 116 Park street, London, W., lent by Lady Beatrice Rawson. Lady Cecil Scott Montagu presided, and explained the objects of such a club and the advantages technically and socially. It was decided to form such a club, which should be called the Ladies' Automobile Club of Great Britain and Ireland, and that the Duchess of Marlborough should be asked to be president and Lady Cecil Scott Montagu, Lady Beatrice Rawson and Mrs. Adair vice presidents. Lady Cantelupe was appointed honorary treasurer. A club committee of fifty members was also elected, and the first meeting was fixed for May 18 at the new club premises, 110 Piccadilly.

The Royal Railroad Division of the Bavarian army, Munich, has just been provided with two Benz automobiles, one of 7 horse power for two persons and the other of 17 horse power for six passengers. A trial trip of 312 miles was made before the

es were definitely accepted by the ties.

Society for Modern Education, which is presided over by M. Bellau, augurated in the Ternes quarter a in automobilism. Class meetings ld every night from 8:30 till 10 at the public school in the rue Fer-

ng to the partial failure of the Nice events this year the Automobile Club e has decided to pay an indemnity of ncs to each entrant for the races ad his vehicle weighed. The total ce fee will be returned to the en- in the Nice-La Turbie hill climbing

The Harkness Racer.

present herewith a photograph of Harkness' racer which was built to e for a place on the American in the Gordon Bennett Cup Race, d not appear at the eliminating trials is now been taken over to France by ner to compete in the various Con- l races of the season.

car has a four cylinder, vertical en- f 5 inches bore and 7 inches stroke, r cylinders being separate. The in- lves are located on one side of the ers and the exhaust valves on the and the valve gear is similar to that e Mercedes motor. The motor is at 75 horse power and was designed T. Birdsall. The transmission gear he sliding type.

car has a stamped steel frame, made e Standard Welding Company, of and, Ohio. The spring horns and ts were welded on after the frame en completed. As will be seen from oto, the frame is hung very low. The ting rods of the engines are steel s made by the Johnson Steel Foun- Spuyten Duyvil, N. Y. The car was led at the works of Gill & Co., South lyn. The weight complete is 2,200 s. The machine was taken over to e in an incomplete state, to be fin- in Paris. It was Mr. Harkness' in- to run it in the Paris-Madrid race.

w Racing Rules of A. A. A.

SANCTIONS.

ny person, association or club (here- referred to as the promoter) desir- hold a race or races under the rules American Automobile Association rst obtain a sanction from the chair- f the racing board. No announce- of such race or races shall be made such sanction shall have been ob- Infraction of this rule shall per- y disbar the offending promoter from ng a sanction from the racing board. he application for such sanction e made to the secretary of the rac- ard, and shall be accompanied by a fee of $50 for non-members of the American Automobile Association, or $10 for members, and shall set forth the name and address of the promoter, a schedule of the events and distances, the number and value of the prizes, the amount of the entry fees and details of the course. If the event is to be run on the road the board may require evidence of the permission of the proper legal authorities. The racing board may refuse a sanction without assigning a reason for such refusal.

3. After a sanction shall have been granted no change shall be made in any of the details required to be set forth in the application for same.

4. No sanction shall be granted to a promoter who shall have previously transgressed the racing rules of the American Automobile Association, or permitted another to transgress them at a meeting under his management.

ENTRY BLANKS.

5. On receipt of a sanction the promoter shall prepare an entry blank, which shall show the details set forth in Rule 2; the date of the closing of entries; the address to which entries must be sent; and which shall require the entrant to supply the name of the operator, the machine he will drive, the name of the maker, the motive power, the weight, supplies included; the number of cylinders, the rated horse power, and the date of mailing the entry. It shall bear upon its face the words, "Under the rules, and with the sanction of the racing board of the American Automobile Association." A copy of the entry blank shall, immediately upon its issue, be forwarded to the chairman of the racing board. A copy of these rules shall be sent by the promoter to every entrant.

ENTRIES.

6. The acceptance of the entries shall be limited to those persons who have not, since January 1, 1903, taken part in any automobile race or hill climbing test not sanctioned by the racing board of the American Automobile Association; and who have never knowingly competed with a person who is not eligible under the rules of the racing board; who agree, by their signatures to the entry blank, to recognize the jurisdiction of the racing board of the American Automobile Association in racing matters; and who have not been debarred from competition in events over which the American Automobile Association or the governing bodies of other nations have jurisdiction. The act of competing at an unsanctioned meeting, or in an unsanctioned event, shall disqualify without further action of the racing board, and such disqualification shall remain in effect until removed by formal action of the racing board.

7. An entry shall consist of a combination of operator and car, the latter being described at the time of the entry. No change of car shall be permitted after an entry has been filed, nor of operator without the consent of the referee.

8. No entry shall be accepted after midnight of the day set for the closing of entries; no entry shall be accepted unless accompanied by the entry fee and all the details required to be set forth in the entry blank. The acceptance of an entry under other conditions shall be sufficient reason for the refusal of a subsequent sanction to the offending promoter.

9. An entry under an assumed name or failure to supply correct information in an entry blank shall result in disqualification.

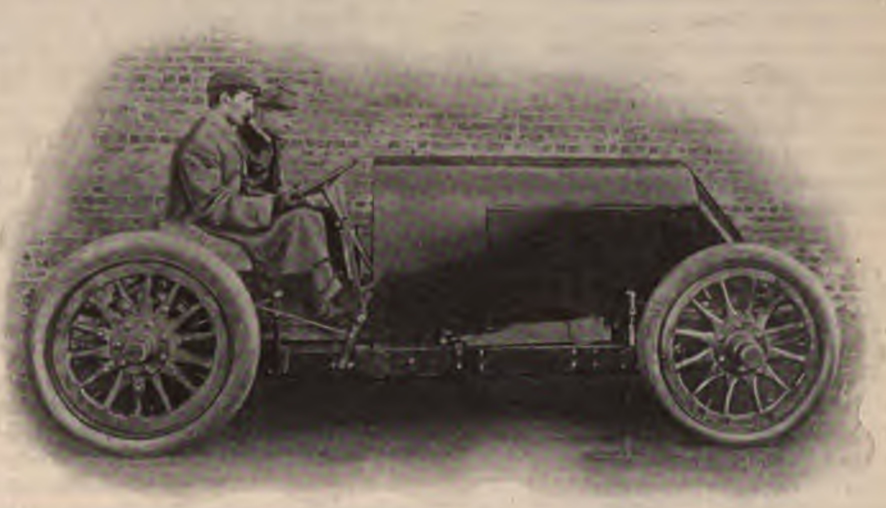
10. A person who enters and once fails to start may, after having been warned by the racing board for a subsequent offense, be suspended for any term not exceeding three months, and in the event of a repetition of the offense be suspended for the remainder of the season.

11. Competitors shall be responsible for all damages—civil or criminal.

CLASSIFICATION.

12. Motor cars shall be classified as follows:

A. (1) All weights and motive powers, no restriction as to operators.



THE HARKNESS RACER.

(2) All weights, supplies included, under 1,200 pounds, all motive powers, no restrictions as to operators.

B. (1) All weights, steam, gasoline, electricity, other motive powers.

(2) All weights, supplies included, under 1,800 pounds, steam, gasoline, electricity, other motive powers.

(3) All weights, supplies included, under 1,200 pounds, steam, gasoline, electricity, other motive powers.

(4) All weights, supplies included, under 800 pounds, steam, gasoline, electricity, other motive powers.

13. To be eligible for competition in Class B, except mile straightaways, cars must be equipped with double acting brakes, compensating and reversing devices, body and hood sufficient to cover mechanism and provide accommodation for one person alongside of the operator.

14. In all events under Class B, cars may be classified as to motive powers (steam, gasoline, electricity) as well as to weights.

15. An automobile, motor car or car within the meaning of these rules, is a four wheeled track or road vehicle propelled by self contained mechanical means.

OFFICERS.

16. The principal officer at a meeting shall be a referee, whose duty it shall be to exercise general supervision over the affairs of the meeting and to act as the representative of the racing board. He shall, if necessary, assign the judges, timers, umpires, clerk of the course and starter to their respective positions and instruct them as to the rules. He shall receive all protests and render decisions thereon, subject to appeal to the racing board. It shall be his duty to enforce the rules and make a full report to the chairman of the racing board of transgressions thereof either by promoters, contestants or officials.

17. There shall be three judges whose position shall be on or at the edge of the track, two at one end and one at the opposite end of the tape. The numbers of the placed cars shall be taken, one each by the three judges respectively. The decision of the judges as to the order of finishing shall be final. The judging of the cars shall be determined by the instant of contact of the tires of the front wheels with the tape.

18. There shall be three timekeepers whose sole duty it shall be to accurately calculate, report and record the elapsed time of placed contestants. In the event of disagreement of the watches, two agreeing, their time shall be official. Should all the watches disagree, the middle time shall be official. In a time handicap the time shall be taken from the start of the scratch contestant.

19. There shall be a clerk of the course, with as many assistants as may be necessary. It shall be his duty to notify competitors, in due time, of the events in which they are entered; see to the arrival of the competitors at the starting point on time and to place them in their respective positions.

20. It shall be the duty of the starter, after he has been advised by the clerk of the course that the contestants are ready, to ascertain that the timers are ready, and then give the signal to start by firing a pistol. He shall have absolute control of the competitors from the time they are reported by the clerk of the course until the start has taken place. In the event of a flying start, the starter alone shall have power to decide what is a fair start, and may use a flag instead of a pistol as a signal to the contestants to start, having previously warned the timers of his intention to do so.

21. There shall be two or more umpires, whose duty it shall be to take positions assigned them by the referee, to note carefully the progress of the race and be prepared to report upon claims of unfair driving by contestants.

22. No persons other than the officials, contestants and one assistant for each contestant shall be allowed upon the track. Contestants and attendants must leave the track as soon as the event in which they are engaged has ended. The stands are for the use of the referee and timers. No other persons shall be permitted therein.

23. The program shall bear upon its face the words: "Under the rules and with the sanction of the racing board of the American Automobile Association" and shall set forth the distance of each race; description of prizes and their value; a copy of the rule relative to the classification of automobiles for racing; the manner of starting; a list of the names of the officials strictly in accordance with the rules relating to same; and a list of the entrants and their numbers.

THE START.

24. In the event of a match race the position of the contestants at the start shall be decided by lot. In open events the positions shall be allotted on the program, the lowest number taking the inside with at least 4 feet intervening between hubs. Entries shall be numbered by the promoter in the order of their receipt. A contestant who fails to respond promptly to the call of the clerk of the course shall forfeit his right to his position and shall take the outside. There shall be no delay at the start on account of absentees and no contestant shall be permitted to take a place in the line after contestants have been reported to the starter by the clerk of the course.

25. The start shall be determined by the instant of contact of the tires of the front wheels with a tape laid across the track.

26. Starts may be either standing or flying. Due notice of the method must be given on the program, but in the event of failure to state the method a standing start shall prevail.

27. All track races shall be run with the left hand of the operator to[...]
rail.

28. The referee shall have power to prohibit any car which [...]siders unsafe, unsuitable or of i[...] construction to start in any event

HEATS.

29. The referee may, in case t[...] a larger number of entries than safely started in one race, divide [...]testants into two or more heat[...] nearly equal numbers as possibl[...] final.

30. A competitor may, if he elec[...] one assistant as a passenger. Af[...]ing been passed by the clerk of th[...] no car shall receive attention at tl[...] of any person other than the co[...] and his assistant.

TRACK RULES.

31. It shall be the duty of the [...] of the leading car to hold the i[...] nearly as may be practicable. O[...]testant overtaking and passing [...] must pass on the outside unless th[...] front shall be so far from the insi[...] render it safe to pass on the inside having passed to the front a co[...] shall not take the inside, or cross [...] of the competitor passed, unless a le[...] full length has been established, penalty of disqualification.

32. Intentional foul driving shall [...]ished by disqualification for all sub[...] events at the meeting, as well as th[...] in which the foul practice occurs, a[...] be punished by the racing board [...]pension not exceeding six months first offense and permanent suspensio[...] second offense.

33. In road racing the rules of th[...] which require a car to keep to th[...] when overtaken, shall be observed competitor when overtaken must al[...] much room as the road permits to hi[...]petitor in which to pass.

34. A competitor who leaves the t[...] road, for any cause, must, if he de[...] continue the race, start from the p[...] which he withdrew. A competito[...] leaves the track or road, or is un[...] continue, in a race run in heats, sh[...] be allowed to compete in a subseque[...] of the same race.

35. The promoter or the referee [...] they consider it advisable, require [...]testant to demonstrate his ability t[...]erly handle the car he proposes to [...]

36. No sign or advertisement of [...]scription other than official desig[...] shall be displayed on a car in an[...] whether on road or track.

37. In road or track races the o[...]ing car must give proper signal by horn.

RECORDS AND TIME TRIALS.

38. No time shall be accepted official record unless taken by [...] three timers, and no private trial [...] recognized unless the timers shal[...] been approved in advance by the board.

Claims for records must be accom- by a surveyor's certificate as to the tness of the distance measured, if track, three feet from the pole, and he road, at its centre, together with ce that the course is level.

The fact that a contestant attempts to the record for a given distance and hall not prevent the acceptance of s at intermediate distances, either ng or flying start, properly attested timers.

In case of a dead heat the event shall again, unless the contestants agree, n themselves, as to the disposition prizes.

In the event of a walkover it shall ional with the referee whether the tant shall be required to go the or part of the distance. The referee npose a reasonable time limit.

PROTESTS.

Protests of every kind must be made referee within twenty-four hours of ish of a race. The complainant must t with the referee a fee of $10, which be forfeited to the promoter if the t is not sustained. A protest may be only by a contestant, and once l can only be withdrawn by consent racing board.

In the event of a protest relative to ication of a car, or other matter which affect the right of a car to start, the e may, unless able to render an im- te decision, allow the car to start and his decision as soon after the event y be possible.

The making or laying of bets shall recognized.

The racing board reserves the right o the appointment of any official; to the timers in private record trials; ign dates; to inquire into and deal ll matters relating to racing, subject rules; to disqualify, either tempo- or permanently, persons guilty of in- n of the rules; to determine who are ho are not eligible to compete; to in- t these rules and to decide any point vered herein as it may consider ad- :.

These rules may be amended by the of directors of the American Auto- Association.

A California Product.

Magnolia Automobile Company, of Sixth street and Eucalyptus avenue, ide, Cal., has recently completed its achine, a gasoline tonneau for four The propelling motor is of about se power, and is capable of driving at from 25 to 30 miles an hour max- speed. The tonneau is detachable rmits of converting the machine into bout for two. The car is to be man- red in lots of a dozen, and quite a r of orders have already been placed derstand. A stock company with o is to be organized to take up the acture of the machine under the ement of R. W. Miller.

LEGISLATIVE AND LEGAL.

In order to better enforce the speed ordinance in Milwaukee, Wis., a detective will pursue offenders in an automobile.

Governor Odell, of New York, signed the Bailey automobile bill on May 15. The complete text was published in The Horseless Age of March 25.

An order has been issued by the Canadian customs officials prohibiting American automobilists from going into Canada without paying the machine's full duty of 25 per cent. of the assessed valuation.

Two additional suits have been brought against the city of Providence, R. I., on account of the automobile explosion in Roger Williams Park on July 13, 1902. The plaintiffs are Stella Clegg and Nelson C. Rice, each of whom asks for $4,000 damages.

Mayor Bookwalter, of Indianapolis, Ind., has signed an ordinance restricting the speed of automobiles to 6 miles an hour within the mile square and 12 miles an hour elsewhere within the city limits.

James D. Adams, of Chicago, Ill., will bring suit against the park board to recover damages for injuries sustained by Mr. Adams on May 11 by being thrown out of an automobile in Jackson Park. It is claimed that the accident was due to the bad condition of the roadway.

An ordinance requiring that automobiles be numbered with figures not less than 4 inches in height and that the same be registered with the city clerk was introduced in the St. Paul, Minn., Assembly on May 12. It was referred to the committee on streets, where automobilists will be given a hearing.

E. A. Mulliken, of Quincy, Mass., who last September was indicted on a charge of manslaughter in causing the death of A. B. Scott with an automobile, has had his case placed on file by the consent of the court, and will pay the costs of the prosecution. He has already settled several suits which grew out of the fatality.

In the first arrest which has been made by the police of Providence, R. I., for speeding an automobile faster than "an ordinary traveling pace," a conviction was secured on May 8. The transgressor was Arthur Lee, and the court interpreted the phase "ordinary traveling pace" to mean "a speed not to exceed 8 miles an hour."

The committee on ordinances of the Buffalo, N. Y., board of aldermen have concurred with the council in extending the low speed district to Ferry street, but recommend that the inside speed be limited to 8 and the outside limit to 15 miles an hour. The council had previously fixed the speed at 5 and 12 miles an hour as the inside and outside limits respectively.

Nassau County is the first county in the State of New York to establish speed limits under the Doughty-Bailey automobile law. At a meeting of the board of supervisors on May 18 resolutions were passed restricting the speed within half a mile of any post office in the county to 8 miles, and elsewhere to 20 miles an hour. The latter provision takes effect at once, but the former cannot be enforced until the signs required by the law are erected warning automobilists where the change of speed must be made.

The commissioners of Radnor, Pa., interpret the new State automobile law not to apply to townships of the first class and temporarily at least will not enforce the township automobile ordinance, prescribing a maximum speed of 10 miles an hour. The commissioners of Lower Merion take a different view of the law, and will enforce the ordinance, which prohibits speed in excess of 10 miles an hour.

A petition signed by residents of the district at Seventh avenue, Thirty-eighth street and Thirty-ninth street has been sent to Mayor Low, of New York, complaining of the practice of dealers who test their machines in Seventh avenue "until they become nuisances and menaces to life." The petition has been turned over to the police captain of the precinct, who has detailed two detectives to make an investigation.

George A. Banker, of Chicago, Ill., will sue the city for damages for false arrest and imprisonment upon the charge of having exceeded the automobile speed law. He has been promised the assistance of the Chicago Automobile Club. City Electrician Elliott is quoted as saying that he has personally detected a growing inclination among automobile drivers to disobey the law, and that if it continues wholesale arrests will follow after the determination of Mr. Banker's case.

It is claimed that the Cleveland, Ohio, ordinance is defective, as it has been found exceedingly difficult to place the numbers on all machines so as to comply with the provisions which require that they shall be so placed on the rear end of the body, central between the rear wheels and so secured that they will not swing and yet be in plain sight without having them attached to the axle or under the body. It is believed an amendment will be necessary to overcome the defect.

Action on the proposed Minneapolis, Minn., automobile ordinance has been delayed two weeks, owing to a difference of opinion between the members of the automobile club and the committee as to the speed limit. The special council committee are inclined to the belief that the proposed limit of 8 miles within a radius of 1¼ miles from the old City Hall is not right, and that it should be made to apply to districts. Meantime notice has been served upon the automobilists by the State boiler inspector that they must secure a license in accordance with the State law, which provides that it is not necessary to take out a State license when a municipal license-fee has been paid, but there is as yet no ordinance in the city.

MINOR MENTION

F. W. Voss, 41 Shumway street, Buffalo, N. Y., intends to build automobile motors.

J. E. Wakefield, Worcester, Mass., is getting out a line of wrenches for automobiles.

The Cook Manufacturing Company, Albion, Mich., will build an automobile for 1904.

A. Disbrow, a farmer of Wichita, Kan., has purchased an automobile for use on his farm.

The Brown-Darnell Company, of Richmond, Ind., have taken the agency for the Cadillac automobile.

A company has been organized to operate a line of automobiles between Averyville, Ill., and Poplar Beach.

M. B. Martin, of Grand Rapids, Mich., is organizing a company for the manufacture of his gasoline automobiles.

The Waltham Manufacturing Company, of Waltham, Mass., have reduced the price of their motor buckboard from $500 to $350.

Thomas B. Jeffery & Co., of Kenosha, Wis., are planning to build what is said will be the biggest automobile factory in the country.

E. S. Callihan, a farmer, of Artesian, S. Dak., has constructed an automobile from his own design, and uses it for doing his marketing.

An addition to be used as an office and machine shop has been made to the factory of the Rutenber Gasoline Motor Company, Logansport, Ind.

B. W. Richardson, Lake street and Prospect avenue, Peoria, Ill., is building a gasoline machine, and expects to organize a company to manufacture it.

W. W. Rudd has purchased and will connect with an automobile garage the old church building at the corner of Jefferson avenue and Ormond place, Brooklyn, N. Y.

John L. French, president of the St. Louis Motor Carriage Company, St. Louis, Mo., is very seriously ill as a result of the street car accident in Pittsburg six months ago.

The Buffalo (N. Y.) Gasoline Motor Company has bought a site 144x107 feet at the northwest corner of Niagara street and Auburn avenue, and will build an automobile factory.

The Hudson Motor Vehicle Company, of Hudson, Mich., have just leased a storehouse at Worcester, Mass., as a New England distributing point, and will have a car there in a week or two.

A race has been arranged between Kenneth A. Skinner and Harry Fosdick, of Boston, at the meet of the Massachusetts Automobile Club, at the Readville track on May 30. They will start from opposite sides of the track, and the race will continue until one has overtaken and passed the other.

C. M. Spencer, of Hartford, Conn., has applied for a patent on a new steering gear for automobiles, which is claimed to be entirely irreversible and to throw the wheels from hard over one way to hard over the other way with a three-quarter turn of the hand wheel.

Under the supervision of Winthrop E. Scarritt, of the Automobile Club of America, there will be held a unique entertainment at East Orange, N. J., on Decoration Day, from 4 p. m. to 10 p. m. The plan is to have various prominent houses decorated to represent the different countries to be visited. The entertainment is organized by the Woman's Guild of the Calvary Church, East Orange.

The Veeder Manufacturing Company think that in our recent description of their tachometers our explanation of the effective range of the scales was not quite correct. Following is their own description: "The lowest effective range of any one instrument is about one-half the maximum, though they can be read with approximate accuracy to one-fifth of the maximum. The lower readings are close together on account of the law that the height of the column varies as to the square of the speed."

Wm. A. Hatcher, formerly superintendent of the Ohio Automobile Company and of the Winton Motor Carriage Company, has associated himself with Francis O. Brew, under the firm name of Brew & Thatcher. The firm has a factory at 32-36 Winter street, Cleveland, Ohio, and an office at 34-38 Columbus street, same city, and will engage in the manufacture of all parts of automobiles, including bodies, but with the exception of wheels. They are now getting out a special transmission, steering gear and carburetor.

Harper's Weekly of last week describes and illustrates a new railway system in which the power required varies inversely with the weight—that is, the greater the weight of the train the less the power needed; trains on this system are to cross the Continent in ten hours, and the horse power required is almost nothing. Truly a stroke of genius to thus change all known laws of friction. Investors will do well to hold their pockets.

G. J. Scott, of Philadelphia, has invented and taken out a patent on a new forming process, consisting in separating the accumulator electrodes during the forming operation by a current conducting baffle or partition, which is interposed between the electrodes in such a manner that i[illegible] enable electric current to pass dir[illegible] one electrode to the adja[illegible] through the current co[illegible] partition and will per[illegible] to pass from one [illegible] but will [illegible] lyte tr[illegible] path[illegible]

Club Notes.

MASSACHUSETTS A. C.

Cognizance of an automobile accident at Weymouth, Mass., where the automobilist escaped recognition, has been taken up by the club, which has offered a reward of $50 for the arrest and conviction of the offender.

A. C. OF CINCINNATI.

At the meeting and banquet of the club on May 9 the question of maintaining a moderate rate of speed was discussed, and the opinion is that automobiles should not go at a high rate of speed through the streets of the city.

The board of managers arranged for the first run on May 10 to Madisonville, a trip of 35 miles.

ALAMEDA COUNTY A. C.

The officers of the Alameda County Automobile Club, recently organized at Oakland, Cal., are as follows: President, Dr. N. H. Chamberlain; vice president, Dr. G. D. Rudolph; treasurer, R. J. McMullen; secretary, F. F. Weston.

ESSEX COUNTY A. C.

The committee appointed to draft a set of bylaws and select officers for the Essex County Automobile Club, Newark, N. J., held another meeting last week at the home of Dr. H. C. Harris, of Glen Ridge, and accomplished considerable in that direction. One feature of the new club will be the legal protection which the organization will extend to its members in case the latter should meet with an accident through which a demand for damages might be made upon them. The best counsel obtainable will be secured, and he will be furnished with means from the club's treasury to carry the case to the Supreme Court, if necessary, to vindicate the automobilist. Such protection will not be extended, however, unless the club is satisfied that the accident happened through no fault of the driver, and that the latter at the time was traveling within the legal speed limits. Another will be to look after good road legislation.

CHICAGO A. C.

Charles W. Gray, the president, is quoted as having said that if the 5 inch figure ordinance is passed by the city council the club will fight the matter in the courts, as it had never been settled that the city has the right to force automobilists to submit to an unpopular law.

[illegible]NG A. C.

[illegible]

n the vicinity of Pittsburg. A cap the design of which is an artillery ›bile wheel with solid gold hubs and of white enamel, and a green wreath nded by a platinum circle bearing me of the club in black, has been l.

A. C. OF MARLBORO.

have received a copy of the constitu- ıd bylaws of this club. The officers resident, Dr. Eugene G. Hoitt; vice nt, Dr. James L. Harriman; secre- ıd treasurer, J. F. J. Otterson; execu- ımmittee, Drs. Hoitt, Harriman and Ellis, Mr. Otterson, George P. and Arthur C. Lamson.

GRAND RAPIDS A. C.

he annual meeting last week the elec- officers resulted as follows: Pres- Charles B. Judd; vice president, Dr. Schurtz; secretary, L. W. Welch; rer, N. Fred Avery; directors, s B. Judd, Dr. Perry Schurtz, N. F. L. W. Welch, L. H. Withey, Walter ıstin, George W. Hart and A. F. r. President Judd has appointed the ıg committees as follows: Member- L. W. Welch, Dr. Perry Schurtz and Fitzgerald. Law and ordinance— Austin, George W. Hart and C. W. son. Auditing—L. P. Cody, Dr. J. lin and W. S. Daniels. The officers same as last year with the exception n T. Byrne, who declined to stand -election as secretary on account of al business. The membership is ılly increasing and a number of new ıtions are waiting to be passed upon. extensive plans are being laid for ›ason, the principal of which are a of touring and automobile picnic par- A committee has been appointed to e the dates. The places to be visited Vhitefish and Gun lakes, Cascade, eld, Green Lake and numerous other

:ommunication has been received he Chicago Automobile Club to the that at least thirty of the members ccept the club's invitation to visit Rapids in the fall to attend some g parties.

club is also laying plans for some minute races late in the fall. They e track events, and a committee is ıg on the scheme.

"A Few Points on Grinding."

have received a copy of a pamphlet above subject issued by the Norton Wheel Company, of Worcester, The pamphlet is a reprint of arti- hich appeared in the *American Ma-* , of February 5, 1903. No subject be more interesting to the metal ıg manufacturer than that of com- l grinding, and the recent rapid s in methods of producing cylin- rapidly and accurately at a reduced cost give the article, rles H. Norton, more than

MOTOR VEHICLE PATENTS..

United States Patents.

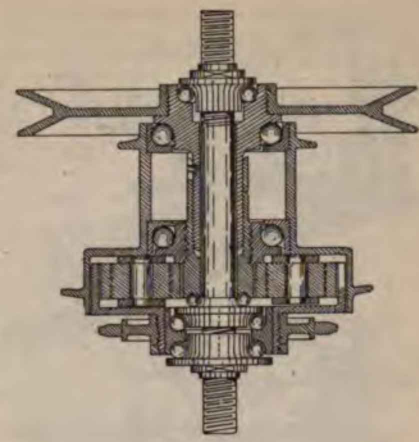
727,231. Motor Vehicle.—R. J. Urquhart, of Liverpool, England. May 5, 1903.

The invention relates to the driving gear of a motor bicycle, and the arrangement is designed so that when either the motor or the pedal crank axle alone is driving or both are driving together, the vehicle will go forward, and the vehicle runs fastest when both are driving forward together, concurrent back pedaling tending to reduce the speed of the machine. When both the motor and pedal cranks are driving, the invention acts as a compensating gear, and the sum of the motions communicated by the motor and the pedals is transmitted to the road wheel. On back pedaling the device acts as a differential gear, and the difference between the two said motions is transmitted to the road wheel, while when either the motor or pedal shaft is stationary the other drives alone and independently.

The gear consists of an epicyclic train or sun and planet gear. The belt pulley is fastened to the central gear, the sprocket wheel to the outer internally toothed gear, and the carrier for the planetary pinions is attached to the driving road wheel.

727,289. Shaft Connecting Gear for Motor Road Vehicles.—Ferd. Charron and Leonce Gerard, of Puteaux, France. May 5, 1903. Filed March 3, 1903.

A band friction clutch for automobiles. The clutch comprises a pulley mounted loosely on the end of the motor shaft and connected to the driven shaft by a Cardan joint. This pulley is surrounded by a metal strap, one end of which is fastened to the flywheel keyed on the motor shaft, and

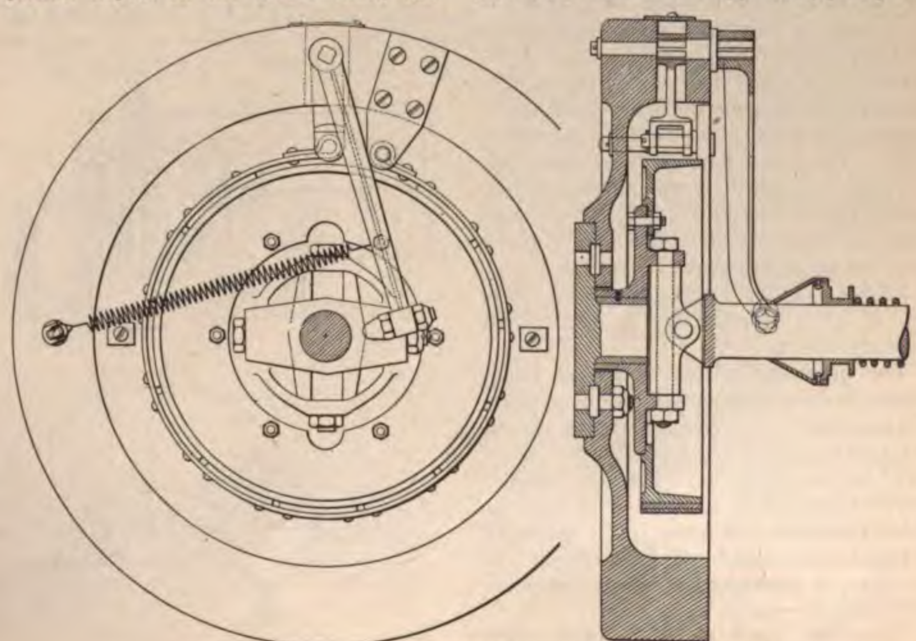


No. 727,231.

the other end to the arm of a bent lever pivoted to the flywheel. The longer arm of this lever is subject to continuous pull of a string attached to the flywheel, so that the end of the lever arm tends to remain in continuous frictional contact with the shaft. The end of the lever is moved away from the shaft by a coiled spring on the shaft, and the clutch band thereby drawn tight on the drum. Even with a comparatively weak spring, the coupling is instantaneous by reason of the arrangement of the levers and the large friction surfaces of the band on the pulley.

726,875. Heating and Igniting Attachment for Self Propelled Vehicles.—Charles I. Dangler, of Cleveland, Ohio. May 5, 1903. Filed March 27, 1902.

This patent relates to improvements in what is known in the trade as the Kelly generator and pilot light. The essential difference between the new generator and the older one is that the latter has three valves—one for automatically shutting off the flow of gasoline to the device, one for regulating the flow of gasoline to the main burner and one for regulating the flow to the pilot light. The drawings herewith show two views of the apparatus, partly in



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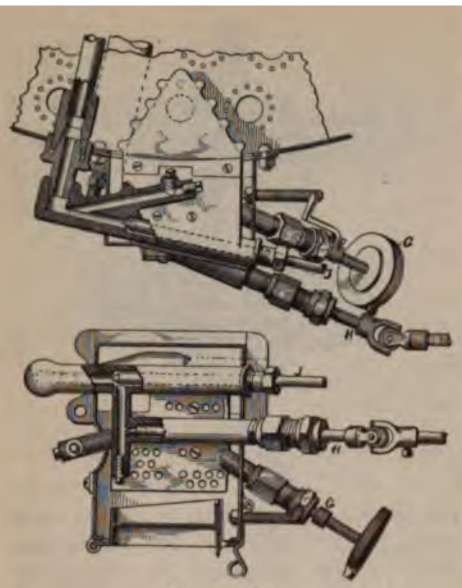


No. 726,875.

section. The valve G may be termed the "initial" or "pilot" light valve—that is, it controls the flow of oil to the initial heating cup, if it be used, and if not it controls the outflow of vapor that has been generated in the attachment by the heating thereof through an alcohol lamp. In the continued use of the valve G during a run of the vehicle the said valve is set to maintain flame and heat in the attachment sufficient to keep it in a generating condition, so as to be able to start the vehicle at any moment.

Valve H is a hand controlled valve from the seat of the driver and enables the driver to turn on more or less vapor to the main burner. In a sense this is the main valve, as it is exclusively employed to determine the quantity of vapor supplied to the main burner, and hence also the volume of heat generated. This valve is, however, inward from valve J in respect to the supply pipe, and in a measure subordinate thereto, that is, the valve J is automatically controlled by the usual steam pressed diaphragm. If the steam be high, the valve is supposed to tell this fact by being more or less completely closed, and if the steam be low it is supposed to be wide open, the pressure of steam determining its position automatically. The vapor having passed valve H, it issues through the vapor nozzle into the mixer tube of the burner. It will be seen that the automatic valve does not shut the gasoline off from the pilot light.

726,841. Pump Regulator.—A. A. Ball, Jr., of Lynn, Mass. May 5, 1903. Filed January 24, 1901.

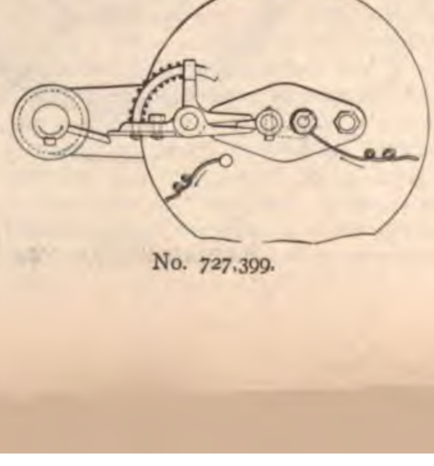
The invention relates to a feed pump regulator for a flash boiler system, and has for its object to provide a pumping system wherein the pump and regulator are so related or connected that when the requisite head or pressure is attained in the tank or other receptacle the pump is automatically relieved of its load, although allowed to continue its movements as before, but without doing any useful work.

The device consists of a casing in which are mounted two check valves of the spring pressed ball type. The fluid from the pump enters the casing through the opening at the upper left hand corner, and leaves the casing for the boiler at an opening directly opposite.

In addition to the two check valves there is a third or bypass valve, which controls the passage of fluid to a conduit connected with the pipe for returning the excess fluid to any desired point. The plug for the bypass valve is provided with a double piston-like head, the areas of the heads being the same, or virtually so, in order that there shall be no, or virtually no, tendency to open. The lower head is provided with a conical surface, which engages with a similar surface formed on the base. The upper head is cylindrical and makes a working fit with the openings in which it is located. By this arrangement the fluid which flows through the device has practically no effect thereon. The upper end of the plug is formed with wings, which act as guides therefor, while the spaces between the ribs form passage to enable the fluid to pass from the casing into the bypass conduit. A compression spring in the lower part of the apparatus normally holds the bypass valve closed. When the pressure in the boiler exceeds a predetermined amount, the bypass valve opens and allows the fluid to escape through the bypass conduit. It will readily be seen that the opening of this valve can only be accomplished when the back pressure in the outlet passage exceeds the pressure exerted by the spring.

727,399. Sparking Igniter for Explosive Engines.—Emil Maerky, of Philadelphia, Pa. May 5, 1903. Filed November 23, 1901.

A hammer break igniter designed to be located in the head of the engine. Both the stationary and movable terminals pass through a plug which is bolted to the head of the engine. To the outer end of the movable terminal is fastened an operating arm which normally rests between a gripping device composed of a lever and a bell crank, both of which are loosely mounted on a common stud. The bell crank has one



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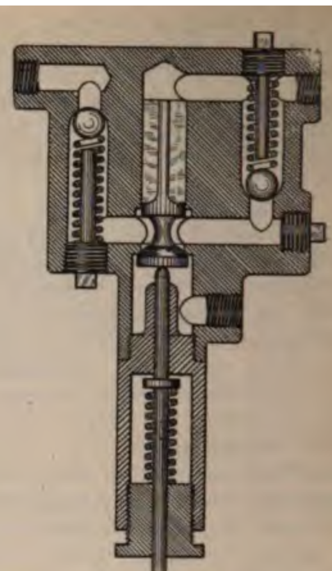

No. 726,841.

of its arms provided with an opening which fits upon a curved guide rod depending from the inner end of the lever, and around the guide rod is placed a coiled spring which bears upon the arm of the bell crank and the inner end of the lever, and brings the fingers of the two into close engagement with the arm on the movable spark terminal. A moment later the contact points within the cylinder are separated and a spark is produced.

726,943. Engine.—W. E. Kichline, of West Bethlehem, Pa. May 5, 1903. Filed September 10, 1902.

An oscillating steam engine for automobiles. One of the claims describes it as follows:

In an oscillating engine, a cylinder having at one side a gudgeon receiving recess, an adjustable gudgeon fitting within said recess and formed of a number of sections, steam supply and exhaust ports formed in each section and opening on the peripheral line of the gudgeons, the cylinder being provided with corresponding parts movable into alignment with the gudgeon ports.

727,003. Clutch.—Patrick J. Shouvlin, of Springfield, Ohio. May 5, 1903. Filed June 26, 1901.

726,971. Igniter for Gasoline Engines.—Jay McCluer, of Springlake, Mich. May 5, 1903. Filed June 9, 1902.

727,563. Electric Switchboard and Circuits.—Vincent G. Apple, Dayton, Ohio. May 12, 1903. Filed August 24, 1901.

727,564. Regulator for Gas Engines.—Vincent G. Apple, Dayton, Ohio. May 12, 1903. Filed October 16, 1901.

727,565. Electric Governor for Gas Engines.—Vincent G. Apple, Dayton, Ohio. May 12, 1903. Filed November 23, 1901.

727,566. Igniting System.—Vincent G. Apple, Dayton, Ohio. May 12, 1903. Filed May 16, 1902.

727,567. Electric Switch.—Vincent G. Apple, Dayton, Ohio. May 12, 1903. Filed June 16, 1902.

727,568. Dynamo Electric Machine.—Vincent G. Apple, Dayton, Ohio. May 12, 1903. Filed October 20, 1902.

THE HORSELESS AGE

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☛ One week's notice required for change of advertisements.

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Reduction of Subscription Price.

We believe the time has come when a technical publication like The Horseless Age will find a wider field of usefulness at a more popular price, and we have accordingly reduced the domestic subscription price from $3.00 to $2.00 a year. Dating from January 1, 1903, subscribers at the old rate will receive a rebate in the form of an extension of their subscriptions—six months for yearly subscribers and three months for six months subscribers.

Notice to Advertisers.

Hereafter the first advertising form will be closed on Saturday and the second advertising form on Monday preceding the date of publication. Copy for new advertisements or changes of copy must be in our hands on or before Saturday in order to secure insertion in the succeeding number.

The Commercial Vehicle Trials.

The Commercial Vehicle Contest of the A. C. A., reported fully in another part of this issue, proved a marked success in spite of the general apathy of the industry and the fact that it was the first event of the kind to be held in this country. The only point in which it was lacking was that the entries in the delivery wagon classes did not fully represent what is being done here at present in this line. The organizers of the contest were, of course, not to blame for this, as the manufacturers objected, not to the particular conditions and rules of the contest, but to any contest for commercial vehicles at this time.

For the light delivery wagons, running on pneumatic tires, the conditions did not seem to be very severe. Of course, they had to mount the various grades with full load, which constituted a good test of their power, but the length of their daily runs—40 miles—was well within their capabilities, even when carrying a full load continuously, a condition not met in ordinary commercial work. There was quite a difference in this respect, however, when the heavier wagons are considered. Aside from the question of power, not nearly as high speeds are possible with steel and solid rubber tires as with pneumatic tires, and in spite of the fact that these wagons were required to travel 30 miles only per day, compared to the 40 miles of the lighter class, they were, generally speaking, the last to finish the daily routes.

All the vehicles, with the exception of one of the heavy trucks, were fitted with some form of elastic tire. The road conditions were not such as to put the traction qualities of the vehicles to a very severe test—that is, the road surface was quite dry and not slippery—but the steel tired truck accidentally got into a soft place on the side of the road at the outward control, from which considerable difficulty was experienced in extricating it.

The routes on the whole were quite representative city streets. Lower Broadway and West street were full of traffic and required numerous stops for this reason. The majority of streets were well paved with either asphalt or macadam, but there were also some sections of stone pavement in poor condition, and even a short stretch of dirt road near the outer control. The hills on the route were as steep as are generally found in our large cities, and a delivery wagon is very seldom required to mount such a long hill as the Amsterdam avenue hill with full load.

On the whole the delivery wagons made a better showing than the trucks. Five delivery wagons started the first day and four completed the entire contest, the one dropping out being a new machine recently completed. Of the four successful delivery wagons two were driven by gasoline, one by steam and one by electricity. Six trucks started in the contest and three of these finished, all three steam. Two of the machines which failed to finish met with accidents which prevented their continuing, and the third, a steam wagon, had not quite boiler capacity enough for the work required and was withdrawn.

The contest has been enough of a success

to warrant similar events being organized in the future. There is little doubt that commercial motor wagons will undergo substantial improvement during the next few years and that the next contest for such vehicles will show a marked advance in this line.

Tires for Commercial Wagons.

Probably none of the problems connected with the construction of motor wagons for commercial work presents such difficulties as that of proper tires. It is generally admitted that none but steel tires will be commercially possible for heavy trucks, yet the designers of these wagons in this country very persistently stick to elastic tires. For the lighter class of delivery wagons, which have so far been mostly electrics, solid rubber tires have been the rule, but recently a change has been noticeable in favor of pneumatic tires for this class of work. Manufacturers seem inclined to develop a class of light delivery wagon similar in power equipment and running gear to their pleasure vehicles and geared moderately high, though lower than the equivalent pleasure vehicles. For light delivery work speed is a positive advantage, and if it can be demonstrated to business houses that the use of motor wagons, besides having a certain advertising value, enables them to give their customers better service, a market for such wagons seems assured, provided their cost is not excessively high. The four light delivery wagons which finished in the Commercial Vehicle Trials were all shod with pneumatic tires and geared quite high, one completing the 40 miles run the first day in three hours and forty-one minutes, or at the rate of over 10 miles an hour for the whole trip.

If for very heavy work only steel tires are practicable, solid rubber tires may have a place on wagons for intermediate loads. The New York Transportation Company, after much experimenting, has finally adopted solid, instead of pneumatic, tires. This class of work of course demands elastic tires to insure the comfort of the passengers, and the results of the experiments therefore permit only a comparison between the two forms of elastic tire, solid and pneumatic. If solid rubber tires are more satisfactory for electric cabs than pneumatic tires there is no apparent reason why they should not be superior for delivery wagons of similar weight, running at approximately the same speed and over the same pavement.

One point of great importance in the application of rubber tires is to use a width proportionate to the load to be borne. With too small tires both the cushioning effect and the life of the tire are reduced and the cost per ton mile eventually reaches a higher figure than if a larger size of tire had been used.

A New System of Organization Proposed.

When the formation of State organizations of automobile clubs was first proposed it struck many as a step in the wrong direction, leading to too great complication in the system of organization of automobilists. Yet the idea certainly has its merits, for one of the chief purposes of organization at the present time is to resist unfavorable legislation, and such legislation is effected by individual States. Certainly no form of organization could so well keep track of the legislative movement in a State and protect the rights of automobilists as a body comprising as nearly as possible all the automobilists of that particular State. Such State organizations should preferably be associations of local clubs, as in that case their formation would be effected with the least difficulty and their control facilitated. Such State organizations of automobile clubs are now in existence in New York and in Ohio.

If the idea of State organizations is to be developed further some plan must be devised for harmonious co-operation between these organizations and the national body—the American Automobile Association. The national and State organizations work in the same cause and for the same purpose, but in legislative matters—at present the main field of activity of all these organizations—a State organization would work to better advantage.

It occurs to us that in order to secure all the possible advantages of organization an attempt should be made to reorganize the American Automobile Association upon the plan of the National Government, to comprise all of the State organizations. The national body has not grown as rapidly as was expected and is not as representative of the movement throughout the country as might be desired, and one of the causes for this slow growth has undoubtedly been that the different local clubs were not certain that any substantial benefits could be derived from membership in the A. A. A. Thorough organization will become a necessity, however, with the increasingly oppressive tendency of automobile legislation, and the organization of State associations proves that this is realized by at least some of the clubs. Membership in the A. A. A., reorganized upon the plan proposed, would offer the following advantages to State associations: In opposing obnoxious bills in the Legislature of their home State the State association would have behind it the moral influence of the automobile movement of the whole country. Co-operation of the various State bodies through one national organization would promote uniform legislation in all parts of the country. Aside from legislative questions membership in the A. A. A would give the clubs that are members of the State organizations certain privileges in connection with the organization of racing events, etc.

The proposal of a national congress of automobilists, recently made in these columns, has received favorable notice from many of the important dailies in the country, and the prospects of such a congress being held next fall are exceptionally good. This would be a fit occasion to consider a reorganization of the A. A. A. upon the plan proposed, as a coalition of State organizations, the latter to have their own board of officers and to direct their own internal affairs.

Local Ordinances Conflicting With Bailey Law.

The municipal speed ordinance at present in force in New York city is in conflict with the new Bailey law, as it limits the speed of automobiles in all parts of the city to 8 miles an hour, whereas the Bailey law puts the minimum speed limit for outlying districts in which houses are more than 100 feet apart at 15 miles an hour. Attention has been drawn to this conflict in the public press, and the ordinance will undoubtedly shortly be amended in conformity with the new law.

Likewise there are ordinances conflicting with the State law in quite a number of towns throughout the State. All the ordinances regulate the speed of automobiles within the entire area bounded by the city limits, and although there are thinly settled districts in practically every city, none has a limit as high as 15 miles per hour, except Buffalo. Automobilists in cities in which such ordinances are in force will do well to prevail upon their local authorities to have them repealed or amended at

once. The Bailey law really repeals all ordinances conflicting with it, but it is thought that while the local ordinance remains on the books drivers may be arrested and fined under Section 666 of the Penal Code.

The champions of the new law have been very prompt in having the restrictive privileges which the law confers upon local authorities exercised—Nassau County, the home of the law, had adopted an ordinance limiting speed to 20 miles per hour in the open country before the Governor's signature was dry. Why should automobilists not be equally prompt in removing restrictions which are contrary to the new law?

Gasoline "Explosions"

In a recent editorial, "Gasoline Not an Explosive," we pointed out some of the important differences between the former and the common explosives, such as gunpowder. The subject was not gone into as thoroughly as its importance warrants, and as a rather serious accident in this city during the past week has lent additional interest to the theme, it may properly be further discussed.

There are two entirely different kinds of explosion, which in the public press would undoubtedly both be referred to as "gasoline" explosions. The real gasoline explosion is the kind taking place in the cylinder of a gasoline engine, in which heat and pressure are suddenly produced by the combustion of gasoline vapor in air. The other kind of explosion referred to may be explained as follows:

Suppose a tank of gasoline placed on a woodpile and the latter set on fire. The heat would raise a pressure in the tank, which, in a strong fire, would rapidly increase and the tank would finally explode. The gasoline would then be thrown in all directions, and, owing to its superheated condition, the greater part of it at least would instantly vaporize, mix with the air of the atmosphere and be ignited by the flame which caused the explosion.

The kind of explosion here described is therefore caused by heat being imparted to gasoline in a tank from an outside source; it is properly called a tank explosion. Gasoline explosion in this case would be as inappropriate a term as "water" explosion for steam boiler explosion.

The last described kind of explosion is not altogether impossible in automobiles, and the accident to the De Witt automobile in New York city last week may have been of this nature. In most touring cars the gasoline tanks are located in the front seat, and are therefore surrounded by combustible material. The car in question, it appears, had a leak in the gasoline system, and a pool of gasoline had collected on the street where it stood. The vapors from this gasoline were accidentally ignited, and the heat developed by this fire (sustained probably both by the gasoline on the street and the woodwork of the body) generated such a pressure in the gasoline tank that it exploded. Such an explosion might have enough force to tear the machine to pieces and cause the serious damage recorded in the reports of the accident.

The moral of this accident is obvious. It is very difficult to set a carriage body on fire unless gasoline has been spilled over it or a pool of gasoline has collected on the ground below it and ignited. The important point is to avoid the spilling or leakage of gasoline. Accidents of this kind to gasoline automobiles are on the whole of very infrequent occurrence, yet the serious character they may assume requires that every possible precaution be taken against them. The gasoline tank should be located in a well protected place, as far away from the hot parts of the engine as possible, even though this may require longer piping. The connections should be thoroughly secure and be inspected regularly.

The Paris-Madrid Horror.

At the time of writing cable reports are to hand of the terrible catastrophes attending the first stage in the Paris-Madrid Race, and of the interdiction of the remainder of the race by both the French and the Spanish governments. All the papers in their reports give first prominence to the frightful accidents which occurred during the first stage, and which, though the course, Paris-Bordeaux, is claimed to be the very best known for automobile racing, are unparalleled in the history of the sport. The details of accidents vary slightly in the different reports, but a careful comparison shows that many "chauffeurs" are dead, two other racers are seriously, probably fatally, injured; several racers "badly hurt" and three persons outside the race killed or injured.

With such appalling fatalities resulting from one stage it is certainly no wonder that the authorities deemed it their duty to interfere and put a stop to the folly. The marvel is that the race was sanctioned in the first place, for the dispatches say that the shocking accidents were not really unexpected, owing to the large number of entries, the terrific speed and power of the racing monsters and the fact that all but the leading machines would constantly be running in a cloud of dust.

The interdiction of the continuance of the race on French territory is positive, and even if the interdiction by the Spanish authorities should prove a premature report, it is almost impossible for the race to be completed. The stress to which machines and drivers were subjected in this first stage over "the finest roads known" may be imagined when it is stated that only 40 per cent. of the entrants arrived in Bordeaux.

Never was the stupendous folly of these so called great international races more forcibly demonstrated. Though 10,000 policemen and soldiers were stationed along the route, accidents were more numerous than ever before. Such precautions may tend to protect the outside public, but cannot save the participants from harm.

When will the automobile clubs of Europe finally recognize the absurdity of the course they have been pursuing and turn their energies into safer and more useful channels? Will history repeat itself in the Gordon Bennett Race?

Calendar of Automobile Dates and Events.

May 25—30.—Alcohol Motor Wagon Trials at Berlin.
May 30.—Massachusetts Automobile Club Race Meet.
May 30.—Hill Climbing Contest of the New York Motor Cycle Club.
May 30.—Automobile Race Meet, Empire City Track, Yonkers, N. Y.
May 30.—Club Run of the A. C. A. to Yonkers.
May 30.—Endurance Contest of the Colorado Automobile Club, Denver.
June 18—20.—Paris Automobile Fetes.
June 18—28.—Aix-les-Bains Auto Events.
June 20—21.—Circuit des Ardennes.
July 1—15.—Irish Fortnight.
July 2.—Gordon Bennett Cup Race.

General Deductions from the Test.

By Albert L. Clough.

No industry can ever become truly and permanently great unless it answers and satisfactorily fulfills some demand based upon a substantial economic need. The business of this world is work, not play. Up to the present time the automobile movement has been pursued under the tacit assumption that "life is all beer and skittles." If the steamship industry were narrowed down to the production of gentlemen's cruising yachts of high speed and of

lines too fine to meet the rough conditions which prevail in actual use, it would then be upon a basis similar in character with the automobile industry of today, which produces almost exclusively vehicles de luxe of speeds beyond the limits imposed by law and by engineering considerations.

The automobile industry as at present constituted is based almost entirely upon the demands of pleasure and regulated largely by the dictates of fashion. It is hardly necessary to point out that under these condition its prosperity would be seriously menaced by the advent of hard times or by a change in the fashionable ideal of what constitutes the "right thing" in sport.

Apparently realizing that the motor must end its purely butterfly existence and be made to assume its share of the world's work, if it is to survive; and warned perhaps by the first signs of waning enthusiasm over motoring upon the part of the leaders of the vogue, the Automobile Club of America has taken another important step upon its mission of guiding and developing the automobile movement by the inauguration of a business vehicle contest.

It is interesting to note that this contest is the first competition of business vehicles ever held in this country, while in England and in some Continental countries such tests are no new thing. The reason is not far to seek. Business conditions are much harder there than here and the question "Can the motor vehicle be made to pay" naturally obtruded itself so much earlier. Here, as there, the same prosaic question must settle the fate of the motor on the road rather than considerations of speed or any faddish popularity.

Considering the extremely rudimentary state of development of the commercial vehicle in this country, it is perhaps remarkable that the entries were as numerous as proved to be the case, particularly as not all the motor interests of the country were united in carrying out the test. The presence of vehicles operated by all three of the recognized motive powers is cause for congratulation, as is also the fact that the test was participated in by vehicles of such widely different carrying capacity—the vehicle of largest capacity handling a load of twelve or thirteen times that of the smallest. While it may be questionable whether vehicles of such widely different character as light parcel deliveries and 5 ton trucks are best tested under identical rules, it is to be remembered that this point and a great many others will only be settled by experience. For the first time in the history of self propelled vehicle tests in this country, fuel other than petroleum was employed, coal being used by several of the heavy vehicles. It may be regarded as regrettable that no vehicles using kerosene or crude oil were entered, as the use of cheap hydrocarbons is considered by many capable of affording a moderate operating cost and at the same time calling for a minimum of attention from the already overworked operators of heavy trucks when used in crowded streets.

Certainly no exception can be taken to the course chosen up on the ground that it was not sufficiently difficult, as the route included difficulties in the way of bad pavements and slippery asphalt as severe as would ever be likely to fall to the lot of a business vehicle used under metropolitan conditions at this season. The road conditions imposed upon the heavy trucks equipped with iron tires by the steep and slippery grades were such as seriously to place in question the practicability of hard tires in city use, without in any degree casting discredit upon the general design of the vehicles, which appeared in every case to possess the necessary power, but not the requisite adhesion. Doubtless these vehicles would have shown commendable climbing ability upon dirt roads. Judging by such data as was obtainable, certain makes of solid rubber tires are earning themselves a good reputation for use upon slow speed business wagons, even of very heavy weight. The mechanical difficulties of securing these tires seem to be disappearing and their life increasing.

Pneumatic tires upon business vehicles are perhaps out of place. Troubles arising from their employment were in evidence in this test, as might have been predicted.

The indulgence in high speeds by the operators of vehicles has been the curse of all previous automobile contests, and in the present test some of the operators seemed to forget that they were handling business vehicles in the midst of a great city and not touring cars out on the open road. If reports be true, the desire for high speed caused the downfall of more than one operator—literally, in one case, under circumstances which might easily have resulted in a fatality.

BODY CONSTRUCTION OF MOTOR DELIVERIES.

When it is considered that motor delivery wagons may legitimately be operated at a pace reasonably in excess of that attained by similar horse drawn vehicles, it is rather strange that the bodies are not constructed to afford the operator a better view of the traffic. It seems to be practice to retain the traditional horse drawn body by which the driver's view is restricted to a general forward direction, and which generally affords no side view except the narrow range of vision obtained through a small window upon each side. Protection of the operator from the weather is a most desirable end, but it is far more necessary that he should have an unrestricted view of intersecting traffic and that the sounds of the same be not cut off from his notice. A well trained horse will often prevent a collision with an intersecting vehicle through its instinct of self preservation, but with the motor vehicle there is no such safeguard, and all safety depends upon the alertness of the driver and his facilities for watching the road in all directions. While it seems perfectly proper to retain the canopy in motor deliveries, it is believed that the sides should extend only from the back of the driver's seat to the rear, and that the back doors should be of glass, covered, if necessary, with a coarse metallic grating.

It was to be supposed that a low centre of gravity had become universally recognized as a desirable feature of any road vehicle, but there were seen among the entries vehicles in which this primary consideration seemed to have been ignored.

The danger of the capsizing of a business vehicle must be minimized, especially when the possibility of skidding against a curb is considered.

GENERAL CONCLUSIONS.

To draw any sweeping general conclusions from the test is certainly hazardous, but it may be stated as having fully demonstrated that loads of widely varying magnitude can be handled by self propelled vehicles operated by electric, gasoline and steam power under the conditions of practice, in a satisfactory manner, as far as the mere fact of getting there and getting back is concerned. What the depreciation of the vehicle is in a test like this will never be publicly known until inspections by engineers are provided for, both before and after the test. The cost of the motive power itself—electrical energy or fuel—was to have been obtained in this test, as well as water consumption, but it is not believed that these measurements were carried out accurately or generally enough to lead to an intelligent comparison of the different vehicles regarding this source of expense.

The relative advantages and disadvantages of the three motive powers have been so often set forth by competent authorities as hardly to warrant a consideration of the question here. In fact, the very natural question, raised a thousand times after a contest of this sort, "Which is the best motive power for business purposes?" is really a superficial one in the same sense as is the question, "What is the best material—stone, wood or brick—out of which to construct a building?" The conditions of use in both cases have to be considered. Some of the considerations involved are:

(1) Safety of motive power.
(2) Simplicity of driver's duties.
(3) Reliability of motive power.
(4) Durability of mechanism.
(5) Freedom from noise and odor.
(6) Low motive power cost.
(7) Controllability.
(8) Weight efficiency.
(9) Radius of action.

By giving these considerations appropriate weight, individually, dependent upon the conditions of the problem and the service desired, a tentative solution of the particular problem may be attempted. There is so much difference of opinion as to how the three powers stand relatively in respect to the foregoing qualifications that it is hardly possible to tabulate them to the satisfaction of any other person than the

tabulator. Experience will, in time, furnish the decisive evidence which shall assign each motive power to its appropriate sphere. Light delivery work in congested districts will perhaps become the province of the electric vehicle. In sparsely settled territory this duty may devolve upon the gasoline engine, while steam may do the bulk of the heavy trucking, pending the application of internal combustion engines to this service.

THE AIR COOLED MOTOR.

Each automobile contest brings out some new tendency or is significant on account of some particular innovation. The present one is particularly noteworthy as being the occasion of the "going into business" of the air cooled gasoline engine. No fuller demonstration of the capabilities of this type of motor could conceivably be furnished than that afforded by their absolutely successful operation during two of the hottest days the city has experienced.

The feat of constructing a successful 16 horse power, double cylinder, air cooled engine is a very remarkable one. A motor of this size is capable of pretty heavy delivery work if the speed of the vehicle is held down by a proper gear, and it would seem that the other motive powers will have to look to their laurels in the presence of a rival of such remarkable economy, radius of action and simplicity.

The test fortunately developed very few radical structural defects in the entering vehicles, good designs were in the majority and the results on the whole most hopeful.

Heavy Vehicle Tires.

By James W. Manson.

With the growing demand for automobiles adapted to purely business purposes the question of suitable tires for such vehicles is of rapidly increasing importance. At first sight it would appear that the experience already gained in the operation of pleasure automobiles would be sufficient for the selection of the proper type of tires for commercial motor wagons, but consideration of the problems involved very soon discloses the radically different nature of the two propositions. The experience derived from the pleasure vehicle is of value, however, even if all that can be said for it is that it has demonstrated what to avoid. Though this may seem a pessimistic view of the situation so far as tires are concerned, it is not really so, for the ingenuity and money spent in tire experiments have been very great, and many of the theories which gave promise of grand results have been weighed and found wanting.

For a clearer understanding of the situation it may be well to briefly contrast the chief tire conditions imposed by the pleasure automobile and the heavy commercial vehicle.

In the pleasure automobile the first set of conditions is that imposed by the demands of the owner for his personal comfort. His automobile must run over the same roads with as much freedom from jolts and jars as his horse drawn vehicle of the same carrying capacity, though the former is expected to develop a considerably higher speed. To get these easy riding qualities manufacturers adopted the pneumatic tire, and despite all the objections that can be made against it, the fact is that for high speeds on common roads the use of the inflated tire is practically compulsory. In theory the spring suspension of the vehicle body should compensate for the vibration due to running over uneven road surfaces, but to the present time this has not been successfully accomplished, and it is also a matter for regret there are so few signs that the millennium of good roads is imminent. The users of pleasure automobiles are painfully aware of the shortcomings of the pneumatic tire, its high cost, its liability to puncture and break down generally, but they seem to regard it as a necessary evil, and pay for it as such.

In the case of the commercial automobile the conditions imposed by the pleasure vehicle driver for his personal comfort are practically absent. The commercial vehicle, particularly in the heavier types, is not called on to run over bad roads at high speed. If it can economically transport freight without damage no complaints are made. In this respect, therefore, the problem is very much more simple, and a pneumatic tire is unnecessary. The resilience of the solid rubber tire is sufficient to meet the demands of the commercial automobile.

The second set of conditions is common to both the pleasure and the commercial automobiles, and is that imposed by the liability of the propelling machinery and the vehicle generally to be strained by the vibrations caused by unfavorable road conditions. If the commercial vehicle were required to travel over the same road surfaces as the pleasure vehicle, this phase of the problem also would be simpler for the former than the latter, but the commercial vehicle is frequently called on to travel over roads that the driver for pleasure is likely to avoid, and often under weather conditions which effectually discourage pleasure driving altogether. The commercial automobile, to be a practical success, must at least be able to do what horses can do under the most favorable conditions, and, if possible, under some conditions where horses are at a decided disadvantage. The heavy commercial vehicle is at present so little used that the relative values of all these conditions are somewhat unknown quantities, but it is reasonable to assume that the capability of the vehicle to work under unfavorable road conditions will be strained to the utmost. It is too much to hope that commercial automobiles can be made strong enough to indefinitely withstand every strain caused by bad roads. I am not at all hopeful that relief from these strains will be obtained through tires of low resiliency, as the expense of such tires largely offsets the economies in repairs due to their use. Rather is it likely that the strains will be accepted as a matter of course, and weak parts strengthened as experience suggests.

The third condition required by the pleasure automobile driver is quietness of operation. In this respect the rubber tire is perfection, but, luckily for the industry, the demands of the commercial vehicle are less exacting.

The fourth condition imposed on the tires of both pleasure and commercial automobiles, that the power necessary for propulsion shall be delivered via the tires, is one that is very serious. Rubber tires give excellent results in this respect on dry roads, and probably are superior to any other available substance under most road conditions, though there are times when their adhesive qualities are very poor indeed. Were the solid rubber tire less expensive its behavior under ordinary conditions would make it a difficult thing to supplant, but its high first cost and the trouble experienced in attaching it to wheels sufficiently securely to permit wearing out the rubber before the failure of the fastening devices in my opinion effectually put it out of the field of heavy motor work.

Just what will be the material of which tires for traction wheels will be made is a question about which it is safe to take the advice of the humorist: "Never prophesy unless you know," but personally it appears to me that a metal tire will prove the fittest to survive in this class of work, and the advantages obtainable by the use of elastic materials will be secured in other ways, or compensated for by the lower cost of metallic tires. It may be well to remember that in the early days of the steam railroad the demonstration of the fact that the friction of an iron wheel on a smooth iron rail was sufficient for traction purposes came as a surprise to many who had deemed it impossible. May the history of the past not be repeating itself in a slightly different manner now?

Fischer Motor Omnibus.

The motor omnibus built by the Fischer Motor Vehicle Company for the London General Omnibus Company on May 6 made a satisfactory trial trip, maintaining a speed of 10 miles an hour. The full complement of passengers—thirty—was carried. Should this omnibus fulfill all its tests more of its kind will be built. Three of the same type are already in course of construction for the London Road Car Company, and should these also turn out well that company will purchase twenty-four more. Then the much to be desired revolution in the traffic of London will be in a fair way of accomplishment. The light motor omnibuses running from Oxford Circus to Cricklewood, London, are said to be extremely popular, and to maintain an average speed of 10 miles an hour as against the 6½ miles an hour of the ordinary horse drawn omnibus.

British Commercial Automobiles.

By J. S. V. Bickford.

At a comparatively early date this country took a good place among the countries manufacturing motor trucks (known in this country as lurries). This was in a great

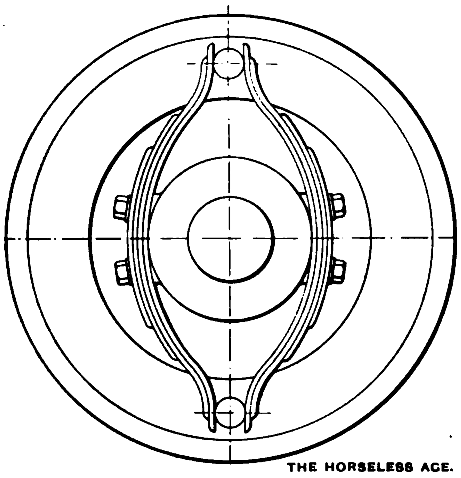


Fig. 1.

measure due to the efforts of the Liverpool Self Propelled Traffic Association, which held a series of yearly trials till the industry was firmly established.

Probably the best known motor truck today in England is the "Thornycroft," built by the well known firm of torpedo boat builders at a branch works they have erected at Basingstoke. This car may be said to be a thoroughly sound practical vehicle, but without any very startling novelties about it. The boiler is of the firm's own design, and consists of two annular water headers, one surrounding the furnace and one about 2 feet above this, between which are placed the tubes in several rows. The advantage of this arrangement apart from steaming capacity, is that the coal or coke used for fuel may be introduced in considerable quantities at one time through a hole in the middle of the upper annulus, so that the vehicle can travel considerable distances in traffic without stoking.

The engine is a horizontal compound of the ordinary type placed under the body, and drives through an intermediate shaft and herring bone gearing on to a pair of springs, as per sketch, Fig. 1, which in turn communicate the motion to points on the rim of the wheels. This method of drive possesses the advantage of being elastic, and at the same time applies the power at the strongest part of the wheel.

The frame, so far as I know, is of ordinary channel section and has nothing very remarkable about it.

In all steam automobiles it is, above all things, necessary that the boiler feeding arrangements should be beyond reproach. This is by no means always the case. A firm in this neighborhood has two steam trucks in constant use, and I have been told that they have had a lot of trouble with the boiler feeding. The arrangements consisted of a pump run off the intermediate shaft of the main engine and another independent pump of the Blake Knowles type, but of which I do not know the maker. Neither of these worked satisfactorily. In the case of the main engine pump this must have been due to defective design of the pump or its position. If a feed pump is placed below the source of supply and is provided with double suction and delivery valves it is practically impossible, with a filter in the supply pipe, to cause it to fail even with boiling water. One very fruitful source of failure in these small pumps is a leaky pump gland. If the pump is placed above the supply of water and has a leaky gland a little air is sucked in through this leak, and that is quite enough to immediately stop its action. It may not be out of place to mention that I have always found the best possible packing for these glands to be ordinary old fashioned gasoline hand lamp wick. That is a plain, round, solid wick about one-quarter inch diameter, soaked in melted tallow. I have had a pump so packed in use now for four months without once having to tighten the gland. Small steam pumps are always a nuisance. On the whole, I am inclined to think that the safest method of feeding these small boilers is to have a well made "drowned" pump on the main engines, arranged with a bypass back to the tank. On no account control the pump by turning off a cock in the suction. This will almost certainly lead to the pumps getting full of air and failing to work. The auxiliary feeding arrangement which I believe to be best is the injector. An injector, especially for high pressures, is a tricky thing, but it very seldom goes actually wrong unless a lot of cotton waste and such like foreign materials are allowed to get into it, and with a little trouble it can usually be made to work if the temperature of the water in the tank does not rise above about 100° Fahr. The success of vehicles of this sort depends to a very large extent on very small matters, such as filters, split pins, Thackery washers (described some time since in The Horseless Age), which prevent the minor breakdown. The maker of a motor car may rest assured that he will get enough breakdowns without courting them by the omission of any precaution which his wit will teach him.

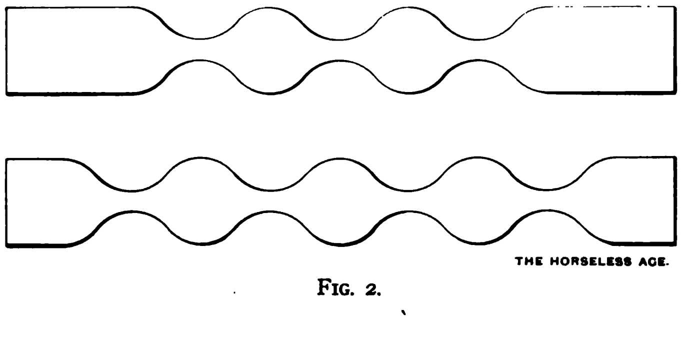


Fig. 2.

Another car well known in this country is the Simpson & Bibby (late Simpson & Bodman), of Manchester. This is, as far as I know, the only firm of truck builders in this country using a flash boiler. Messrs. Simpson & Bibby's boiler is of peculiar construction and is made of Royle indented tubes, which is said to increase its efficiency. Fig. 2 shows a piece of Royle tube in elevation and plan; it will be seen that it is alternately indented from alternate sides. The effect is to break up the stream of water passing through the tube into a series of sprays which increases the steaming capacity of the boiler. Fig. 3 shows the arrangement of the boiler. It will be seen that the tubes are coupled up in series. That is, all the water entering the boiler has to pass through every tube in turn. The steam, on leaving the boiler, in some cases passes through a special apparatus to remove the superheat, as it was found that sometimes, especially when standing for some time, the boiler became so hot that the steam damaged the engines. This apparatus consists of a small drum through which the steam passes on its way to the engines and through which passes the pipe H carrying the feed water to the boiler. The result is that the cold feed condenses some of the steam and this has the effect of reducing the temperature of all the steam to such an extent that dry saturated steam only is produced and passed on to the engine. (Fig. 4.)

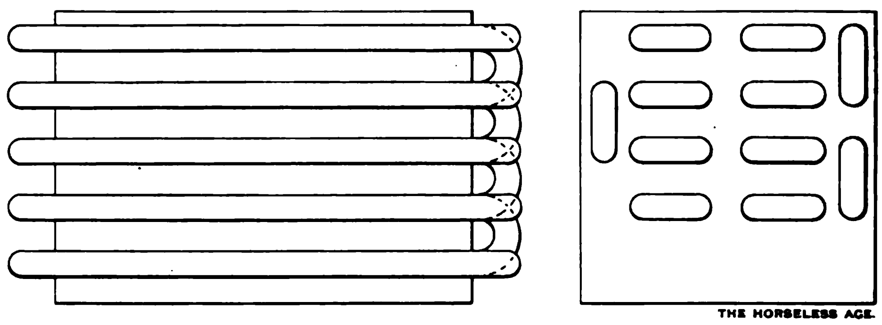


Fig. 3.

This is the only car on the market having two complete sets of engines to ~

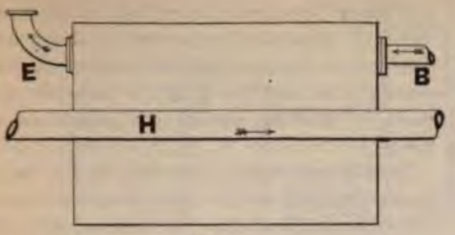


FIG. 4.
E, steam to engine; B, steam from boiler.

It has often struck me that it would be nearly as cheap to put in two sets of engines for this work as to put in a live countershaft and differential somewhere.

The engine used is at present of the three cylinder single acting with poppet valves. Originally the engine was of the Brotherhood type. That is to say, all the cylinders were arranged radially and worked onto one crank shaft, the arrangement of connecting rod big end being probably as per sketch, Fig. 5, which is similar to the arrangement used in the Serpollet car for two cylinders only.

It will be seen that the big end brasses are reduced to less than half the circumference of the bearing and there are no lower brasses at all. To take the pull of the crank on the connecting rod when running idle (being a single acting engine there is never any pull by the connecting rod on the crank) loose rings are placed round the backs of both brasses as shown at A A. The arrangement is very satisfactory, and experience with friction apparatus shows that not only is there no disadvantage in making the bearing embrace less than half the journal, but it is a positive advantage and has been introduced into standard practice for railroad truck wheels on the Great Western Railway of England.

The valves of this original engine were of the lift type, as in a gasoline motor, but there were no exhaust valves, the piston uncovering holes in the cylinder walls at the end of the stroke. Very shortly this engine gave place to three cylinders in line parallel to one another, and exhaust valves were introduced. It would be interesting to know how many successive inventors have traveled over this path. I know that many have besides Mr. Simpson and myself. Excepting for the special work performed by the Brotherhood engine for driving torpedoes, etc., there is now only one being made (the Hydroleum Company), and I would be willing to wager that that will be modified in time in the direction of exhaust valves and cylinders in line. The reason is as follows: With exhaust through the cylinder wall compression is hopelessly high, and in fact the engine's performance is very bad indeed, though it will run light with surprising speed and silence. It is when the load comes on that the shoe pinches and the engine coughs and kicks like a broken winded mule.

The objections to cylinders arranged radially are as follows: The advantages of

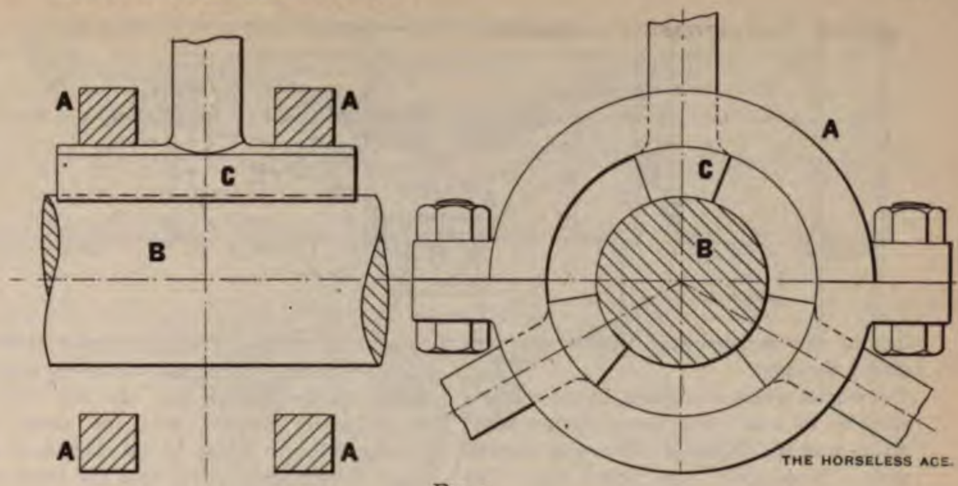


FIG. 5.

single acting engines are that they are easy to lubricate by splash, and the thrust being always in one direction there is never any knock even with loose brasses. Both these advantages are sacrificed in the radial type of engine. Crank chamber lubrication is obviously impossible, and though the thrust in each connecting rod is in one direction yet in the crank shaft this is not the case, and as soon as the crank shaft is a little loose it begins to knock badly.

To return to the Simpson & Bibby lurry. The engines are carried at the extreme rear and, as said, there are two sets placed with their crank shafts in line and means are provided for coupling their crank shafts at will for getting out of a tight place.

Many of the best known English vehicles have already been described in THE HORSELESS AGE, but I do not recollect to have seen anything of the Yorkshire steam wagon. The noteworthy features of this car are the boiler and the means of preserving the distance between the gear wheel axles constant while allowing for the spring of the car body. The boiler consists of an arrangement (Fig. 6) something between a loco and a marine return tube. The fire box is in the middle and has tubes running in opposite directions, as shown, to a smoke box at each end of the boiler. From this box another set of tubes communicate with a second smoke box at the base of the funnel. It will be noted that the exhaust steam is introduced into the smoke box covers, and from this is directed into all the tubes leading to the funnel from a series of small pipes set in the inside of the smoke box cover.

Fig. 7 shows the transmission gear patented by the makers of this car. It will be seen that the rear wheel bearing is carried in the frame A at B. This frame is pivoted at C and its other end slides freely on the pin D. The second motion shaft has bearings at E, while the first motion or engine shaft bearings coincide with the bearings of the rocking frame at C. A moment's consideration will show that by this means the distances between the cen-

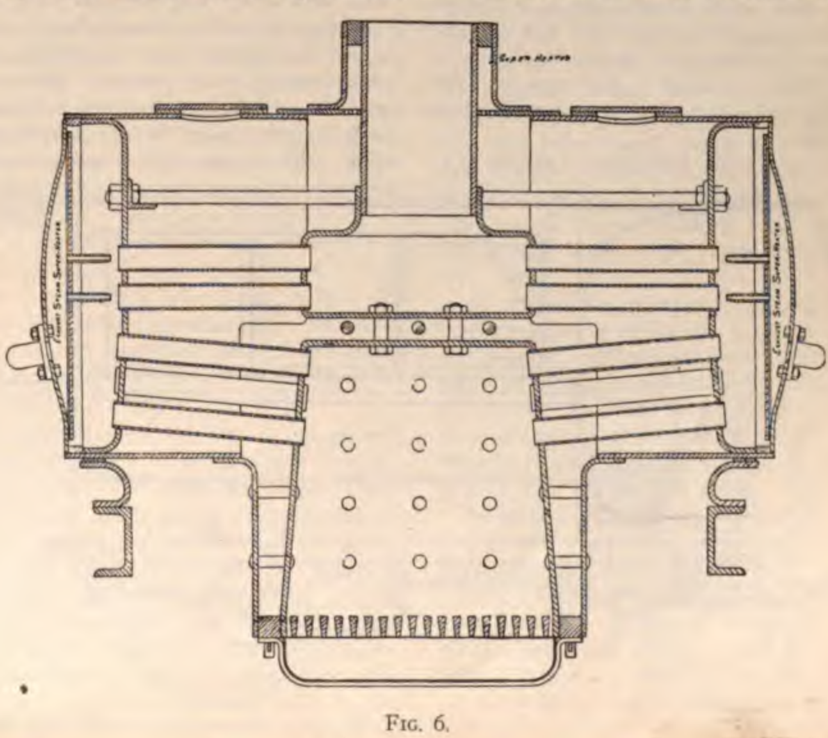


FIG. 6.

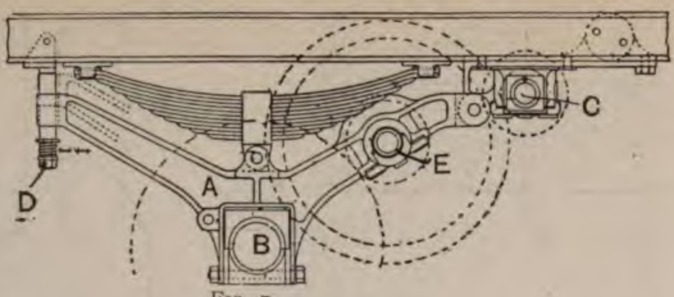


FIG. 7.

tres of the various gear wheels are preserved constant.

A wagon which attempted, in the writer's opinion, to make too many things automatic was the Musker. This was worked with a flash boiler and liquid fuel. The burner used was for all practical purposes very much like the one made by the present writer's firm for some time and was worked by a fan blast. This blast was provided by a small engine under the frame of the wagon. The steam to this engine and the oil to the burner were both controlled by the steam pressure, as was also the water to the flash boiler. The effect was to slow off the burner and the water supply when the boiler pressure rose too high. The result does not seem to have been very satisfactory in practice, though the apparatus is said to have worked well in the shops.

It may be taken as an axiom in engineering that the fewer parts there are to get out of order the more likely the machine is to work well. It must not be forgotten that everything made by man will break down sooner or later, and that to insure a breakdown every day it is only necessary to multiply parts up to a certain and very definite limit. Thus if a certain part of a car breaks down once in three hundred and sixty-five days on the average it is only necessary to have three hundred and sixty-five such parts to average a breakdown every day. This proposition was lost sight of to a considerable extent by the earlier car builders, but it is beginning to assert itself, and every day cars are becoming simpler.

A useful little arrangement shown at the recent Agricultural Hall in London is designed especially to comply with the regulations of the British law. In this country a motor vehicle must be under 3 tons unladen in order to be classed as a "light locomotive"; over that the traction engine laws apply and are somewhat onerous. The machine under consideration consists of nothing more or less than a small size traction engine capable of drawing a large wagon after it, and whatever disadvantage such a plan may have the experienced gained in the past with traction engines is now considerable, so that on the face of it satisfactory running is more probable with a traction engine than a motor car. A condition of things which is likely to obtain for some time to come.

THE OPERATOR.

I should like to stop here to say a word or two on the management of these vehicles. I may take as my text the arrangements of a firm near here who picked up a laborer and had him run their car after having him shown how by the maker's man for a while. This is simply a disastrous course to pursue and will lead to enormous expense in the long run. An automobile is a more-than-a-little complicated machine, and it can only be run economically, as far as repairs are concerned, by a skilled hand. The writer had a considerable experience some ten years ago with steam launches and small steam yachts, and he then found that it paid to give the highest rate of skilled fitters' wages ruling in the district. This also applies to automobiles, and the best method will be found to be to hire a fairly skilled fitter who has served his time in the shops and have him shown how to run the car. He will then be competent to make his own minor repairs, and, what is more important, he will be able to forestall repairs by making necessary adjustments in time.

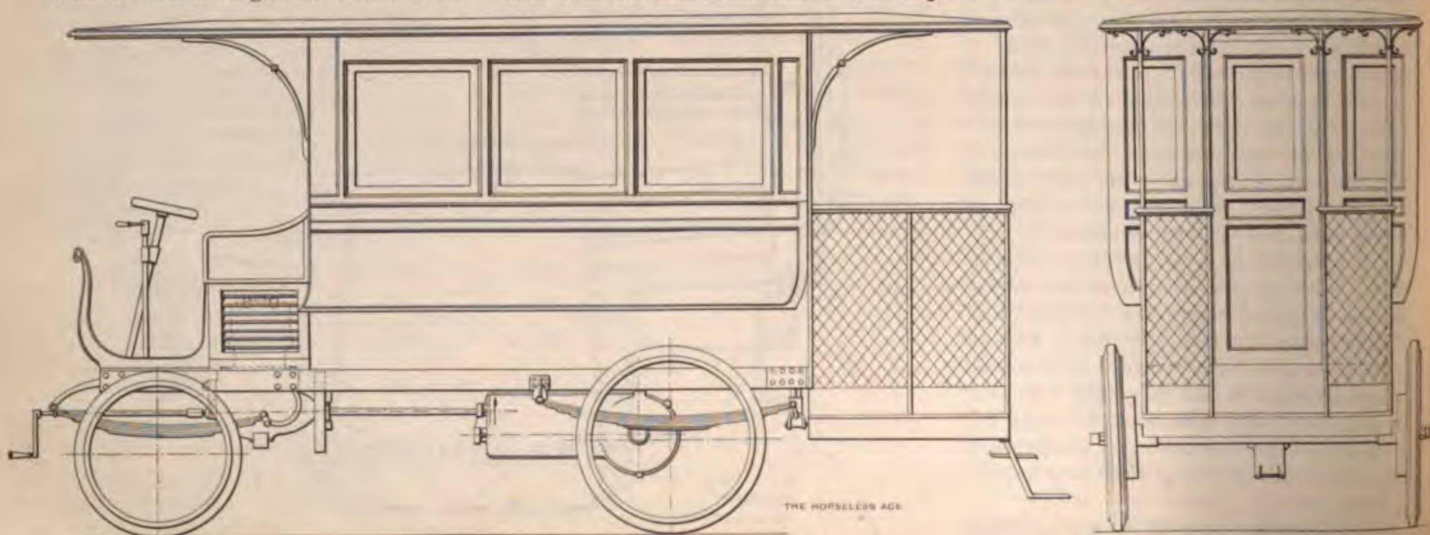
It is a surprising fact that as far as is known to the writer there is not a single delivery van suitable for dealing with up to 15 hundredweight of goods on this market. There is one firm, the makers of the Rex motor, which supplies a delivery van, but as they supply it with alternative bodies for business or pleasure purposes it can hardly be called a delivery van pure and simple, as it is their usual tonneau car with a van body instead of a tonneau. There is a very big demand for these things, and it will of course be sooner or later supplied. Perhaps the reason why no one is taking it up is that at present the prices of successful pleasure cars are so enormously high that this market is too tempting. For instance, a 20 horse power pleasure car will readily fetch $4,500, whereas there were some cars in last year's trials of this power listed at $3,250, showing that they can be produced at the lower price. The extra profit represented by the delivery premium is very tempting. Manufacturers should, however, remember that a business founded on a business demand is worth many times as much as one based on a pleasure demand, and when the makers of pleasure cars are feeling the pinch the maker of a sound business vehicle will probably have things all his own way.

Commercial Motor Vehicles in France.

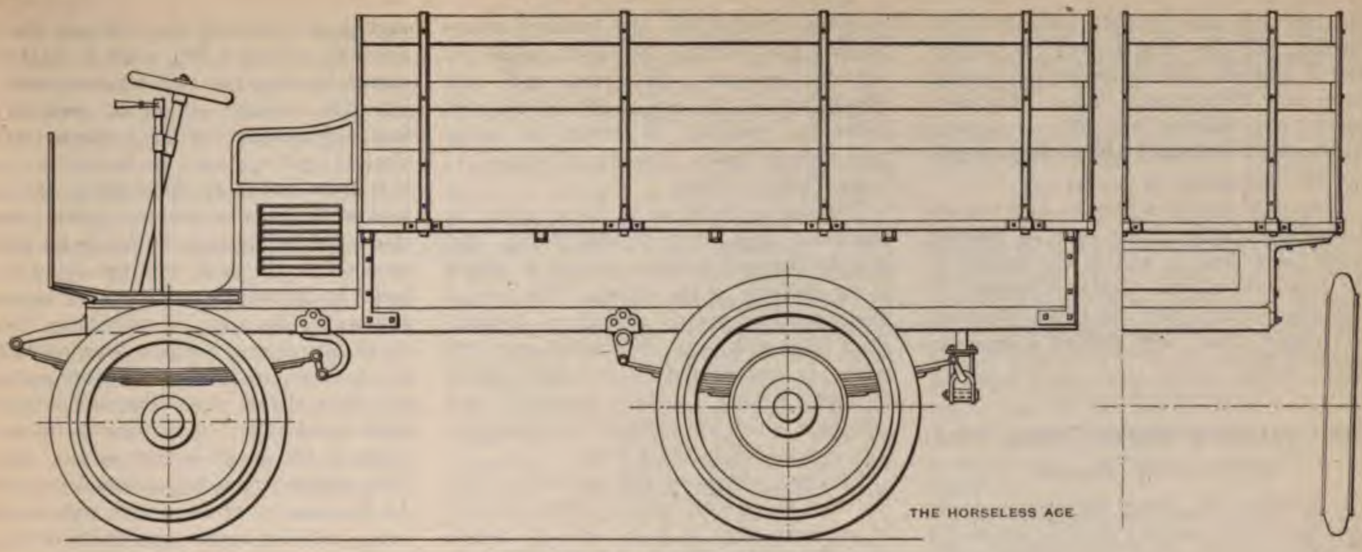
BY DR. LEON GUILLET.

The present article serves the object of giving a brief outline of the present status of the commercial automobile in France. The article will be divided into two parts, viz., (1) a description of the principal vehicles; (2) their actual applications.

The principal firms building commercial motor vehicles are the following: De Dion & Bouton, Panhard & Levassor, Serpollet,



FIFTEEN HORSE POWER DE DION OMNIBUS.



TEN HORSE POWER DE DION TRUCK.

Société Nancéenne d'Automobiles, Maison Scotte, Turgan & Foy. To these must be added a few firms building electric vehicles, but we shall have very little to say about these. We intend to briefly describe the principal models of each firm, confining ourselves to the more recent types and even to those of which the first examples are still building. In the second part of this article we propose to give a complete review of the development of commercial automobiles in France, with particular reference to the very interesting question of the cost of the work done by these vehicles.

DE DION & BOUTON.

This firm until recently built commercial vehicles driven by steam, comprising a multi-tubular boiler of special construction and a compound engine. For some time, however, they seem to have abandoned steam and taken up gasoline instead. After having for years made vehicles of large capacity and great load they have turned their attention to vehicles for moderate loads and capable of higher speed, which are demanded by merchants and manufacturers. In the new series of goods vehicles either the single cylinder 8 horse power gasoline motor or the two cylinder motor is employed.

Among the single cylinder vehicles which are equipped with three speeds and the special De Dion Cardan rear wheel drive may be mentioned a truck capable of transporting a load of 1,500 kilograms (3,300 pounds) at a speed of 15 kilometres (9.4 miles) per hour, a delivery wagon carrying 1,000 to 1,200 kilograms at the speed of 10 miles an hour, and an omnibus with seats for eight passengers and capable of a speed of 12½ miles per hour, which is specially designed for railway station work, hotel service, castles, etc. The running gear frames of these various vehicles are of armored wood and the motor is placed under the seat, in order to make the vehicle as compact as possible.

But the most interesting delivery wagons are those of greater power, fitted with a double cylinder motor. The details of this power equipment were described in a recent number of THE HORSELESS AGE. On this same chassis are also mounted other types of commercial vehicle bodies, as follows: Gasoline omnibus of 15 horse power, which is capable of transporting 12 passengers, 8 inside and 4 on the platform. It is fitted with the regular two cylinder motor and a three speed transmission gear. The slowest speed is 2½ miles, the medium 5.6 miles, and the high 14 miles per hour. The weight of the omnibus empty is 3,960 pounds. In the calculation of the load to be carried each passenger has been figured as weighing 100 kilograms (220 pounds). The wheel base is 98 inches and the total length 190 inches. The track measures 58 inches and the width of the platform 48 inches. The front wheels are 32 inches in diameter and the rear wheels 36 inches. The wheels are shod with solid rubber tires.

The second new type which the firm is putting in hand is a 15 horse power truck, also fitted with the two cylinder motor. Its weight, empty, is 1,500 kilograms (3,300 pounds); the useful load 2,200 kilograms (4,840 pounds). The consumption of fuel is equal to .450 cubic decimetre per horse power hour. The three speeds are 2, 5.6 and 11.2 miles per hour respectively. The diameter of the rear wheels is 36 inches, that of the front wheels 32 inches; the track is 58 inches, the wheel base 100 inches and the total length 182 inches. The length of the platform is 126 inches and its width 64 inches.

The third type of the firm is the delivery wagon. It has a 10 horse power two cylinder motor and armored wood frame. The length of the frame is 126 inches, its wheel base 84 inches, the track 58 inches. The total length of the delivery box is 88 inches and the width 39.6 inches. Finally may be mentioned the 10 horse power truck, which has a wheel base of 84 inches.

In conclusion, the description here given of the commercial vehicles built by De Dion & Bouton shows that this firm has given much attention to this very interesting problem. It also draws attention to this highly important point, that this firm, which for many years built commercial vehicles driven by steam, has decided in future to employ only gasoline power for these vehicles.

A. C. A. Commercial Vehicle Contest.

The commercial vehicle tests held under the auspices of the Automobile Club of America were a disappointment as far as the interest evinced in them by the majority of the manufacturers was concerned, for out of the hundreds of concerns in the automobile industry today less than a score took the trouble to enter machines, and the makes of concerns who have done most in this particular branch of the business were highly conspicuous by their absence.

Never before was the trend of the automobile manufacturers' efforts more clearly shown than when twelve business vehicles out of the fourteen entered lined up on Fifty-eighth street, near the A. C. A. club room and started on their run from the same point where over sixty vehicles of the strictly pleasure class left for Boston last fall, and an almost equally large number started on a hundred mile run to Bridgeport, Conn., and return last Decoration Day.

All the official observers, having visited Secretary Butler of the A. C. A. on Tuesday evening and received their assignments, were on hand promptly at 8 o'clock on Wednesday morning at the official garage in the storage station of the New York Transportation Company's depot, at Eighth avenue and Forty-ninth street.

As early as 8 o'clock a number of steam and gasoline wagons were out in the street surrounded by curious crowds.

The street near the storage station was alive with the noises of preparation, the sharp explosions of the gasoline motors being intermingled with the snorting of the steamers as the safety valves popped off.

It was 8.30 o'clock when all the vehicles

had been officially weighed and filled with supplies, and they then started off irrespective of numbers, and made for Fifty-eighth street and Fifth avenue, where they were sent off over the first stage of the course at three minute intervals by Secretary Butler and his assistants.

Only two machines entered had not put in an appearance at the time of starting, these being Nos. 4 and 8, the entries of the Motor Truck and Vehicle Company, of Columbus, Ohio, and the Grout Brothers, of Orange, Mass., who entered a steam delivery wagon.

The Coulthard Steam Truck, No. 1.

By James W. Manson.

It afforded me much satisfaction to be assigned to the position of observer on the Coulthard steam truck, the vehicle being one which, though well known abroad, has not been put to any commercial use in this country. Embodying the results of several years' English experience in heavy commercial automobile construction, the performance of the vehicle is of special interest in America at the present time, when the commercial self propelled vehicle is beginning to receive its share of attention.

The Coulthard Truck Stalled on Soft Ground.

The Coulthard truck has already been described in the columns of The Horseless Age, and it is now unnecessary to go into details, but for the purposes of the present statement it may be fitting to say that the vehicle is of the lorry type—i. e., a level platform mounted on wheels so low as to offer no obstruction to loading from the sides or end. In this particular vehicle, however, end loading was obligatory on account of two side boards having been fitted to the platform, but, it may be added, these were readily removable. The space immediately over the front wheels is given up to the seats of the attendants, fuel bunkers and the boiler, which is of the upright fire tube type. The fuel used is coke, which is fed to the top of the fire through a vertical chute passing through the centre of the boiler. The two cylinder, horizontal compound engine and the enclosed transmission gear occupy the space below the platform between the front and rear wheels, and at the end of the vehicle, also under the platform, is carried the water tank, which has a capacity of about 213 United States gallons.

The engine, rated at 30 horse power, is controlled by a form of link motion, and may be changed from compound to simple at the pleasure of the driver. Provision is made for two speeds through a countershaft fitted with bevel differential gear, and power is transmitted to the rear wheels through Renold chains running over sprockets which are mounted on triangular frames attached to the felloes.

The rear wheels of this particular vehicle were fitted with special composite tires of alternate rings of hard and soft metals, the object of which is to secure greater tractive effect. Steering is by means of the front wheels, which are mounted on pivot axles in the usual manner.

The behavior of the truck in the two days' test, so far as ease of management is concerned, struck me as highly satisfactory, the two incidents which caused the delays, to be referred to later, being in no way chargeable to faulty design. The steering, braking and speed changing mechanism worked promptly and without failure of any sort. The steaming capacity of the boiler was ample at all times for the duty required, and, beyond supplying the furnace with fuel, practically no attention was given to the fire except at the end of each stage of 10 miles.

The greater part of the noise in operating the truck was caused by the rolling of the wheels over stone pavements, and, considering the weight of the load, the speed of the vehicle and the use of metallic tires, it could not, in my opinion, be called excessive.

The vehicle was weighed with and without load before the tests, and stood at 14,225 pounds empty and 24,225 pounds loaded. The load of 10,000 was composed of cast iron pipe fittings. The weight of fuel carried on the first day of test was 690 pounds, of which 675 pounds were consumed between the starting point and finish. The quantity of water used on the first day of test was 435 gallons. At the start 213 gallons were in the tank, 103 gallons were added at Kingsbridge, 179 gallons were taken at the end of the second stage, and at the end of the run 60 gallons remained in the tank, the water level of the boiler at the start and finish being as nearly as possible the same. I cannot say for the above figures that I regard them as correct, the facilities for measurement of water at the Fifty-eighth street hydrant being far from satisfactory. According to the measurement of water on the second day at Fifty-eighth street, 245 gallons were taken. As the capacity of the tank is only 213 gallons, and the boiler was filled after the supply was taken, it can readily be seen that the water charged against the vehicle was in excess of its tank capacity—a manifest impossibility. It is to be regretted that circumstances told against accuracy in this respect, but the facts are as stated, and for the purpose of arriving at the boiler efficiency the figures are, to my mind, quite inconclusive. I was unable also to accurately determine the weight of fuel required to raise steam on both days, the facilities for weighing small quantities at the storage point being very unsatisfactory. As nearly as I could arrive at the quantity used, it was for the first day 60 pounds and 50 pounds for the second. On the first day steam was raised from cold water to 215 pounds in twenty-eight minutes, and on the second to 200 pounds in thirty-one minutes.

On the first stage of the first day nothing of interest occurred, though at one time it looked as if two horses attached to a watering cart would cause trouble. The driver was not in evidence, and perhaps it was just as well, as the animals evidently decided for themselves that they were in no imminent danger, and the incident closed.

The hill on Amsterdam avenue was climbed in seven minutes, including two slow downs on account of traffic. Kingsbridge was reached at 10:17½ a. m. Fire was cleared and water taken in the required ten minutes, but on attempting to start the left rear wheel was found to have sunk in a bad spot in the road to a depth of about 6 inches, and defied every effort to pull it out. The road at this point is a newly made one of the dirt variety, and the waste water from the hydrant or some other cause had made it too soft to properly support such a load as was put on it on this occasion.

Two hours and ten minutes were spent in digging out the wheel sufficiently to permit the journey to be resumed.

At 230th street a short steep macadam hill caused the truck to stop three times, the stops on each occasion being due to large stones projecting two or three inches above the surface.

Backing sufficiently to escape these, the ruck gained the top and proceeded without further incident to the end of the second stage at Fifty-eighth street, which was reached at 2:17 p. m. The only stops other than those mentioned were to change speeds on hills, which operation occupied few seconds.

At 3:20 p. m. the start was made on the third stage of the route, through the crowded trucking district of the city. Slow downs were quite frequent, and eight full stops, aggregating one minute and fifty-five seconds, were necessary on account of traffic. The driver showed great skill in handling the vehicle, particularly on Fifth Avenue and on lower West street, where the traffic was very heavy, threading his way through the maze of trucks and carriages without any apparent difficulty.

The end of the third stage was reached at 5:08 p. m. The running time for the entire 30 miles was 4 hours 42 minutes and 5 seconds, or an average speed of 6.37 miles per hour.

THE SECOND DAY.

The second day's test was over the same route as before, with the added requirement that ten stops of fifteen seconds each be made at specified points. Two of these stops were on the Amsterdam avenue hill, one on the down grade of 6 per cent, and the other on the 7 per cent. up grade. Through a misunderstanding the driver did not strictly comply with the requirement to stop for fifteen seconds, and made a momentary stop only. On the up grade stop at 132d street the vehicle was stopped for the proper length of time, and started without difficulty, no preliminary backing being necessary. The performance of the metallic tires on the Belgian blocks and car tracks on the hill was interesting by reason of the fact that no sanding of the track was required at any time. The end of the first stage was reached at 10:28 a. m., and the start on the second stage was made at 10:47.

At 230th street a stop of six minutes was made to permit two other vehicles which were ahead to get over the hill. The ascent was made without difficulty. About a mile farther on the annoying discovery was made that the steam pipe from the boiler to the engine was fractured, and it was decided to fit a new one. This caused a delay of five hours and thirty-six minutes, the actual fitting of the pipe being accomplished in one hour and ten minutes. This done, the journey was resumed, and the end of the second stage reached without further trouble at 6:02 p. m.

The start of the third 10 mile stage was at 6:19 p. m.; the finish at 7:51 p. m. It was over the same streets as on the first day, and included eight specified stops of fifteen seconds each. All of the stops and starts were made without difficulty, the only deviation from the program being a stop at Bleecker instead of Houston, which was due to my error in mistaking the street. Slow downs on account of traffic were not so many as on the previous day, and there were but two stops outside of those specified—one of five seconds at Fifty-sixth street to change speed gear, the other of fifteen seconds at Twenty-third street for the fire department. The run was finished at 7:51 p. m.

On the second day the actual running time was four hours and twenty-five minutes.

It may be of interest as a matter of comparison to state the record of the two days' run in ton miles, based on the actual running time. Load, 5 tons; distance, 60 miles; running time, 9h. 7m. 35s.; average speed per hour, 6.57 miles; work done, 32.85 ton miles per hour.

The Herschmann Steam Truck, No. 7.

By Henri G. Chatain.

The details of this wagon have been fully given in The Horseless Age, and it may be necessary to state only that solid rubber tires are now used on the vehicle. All the accompanying data, collected during the two days' run, are given below in tabulated form. The vehicle, not conforming to any of the classes of the competition, was run in a miscellaneous class and made to cover the course designated for Class II.

This vehicle is operated entirely by one man. An extra man was taken along, but during the two days he did absolutely nothing in regard to the operation of the machine, it being easily handled by the operator alone.

The run from Fifty-eighth street to Kingsbridge the first day was absolutely without incident, there being no breakdowns and no stops, except to shift gears occasionally. At Kingsbridge water was taken on but the fire was not cleaned, which afterward proved to be a mistake, as it would have saved several minutes to clean the fire while taking on water. (Ten miles seems to be the distance that a steam wagon will run creditably without cleaning the fire.)

The return trip was also accomplished without incident, except that the fire was cleaned. As the day was extremely warm, the operator and the observer took a little more time for lunch than was prescribed by the rules. Starting from the clubhouse at 2:58 p. m. for the trip down-

A Scene at the Start on Fifty-eighth Street.

town gave an excellent opportunity to observe the behavior of the wagon in the thickest traffic possible on West street. The wagon operated excellently. Several stops were made on account of traffic, but no involuntary ones. The run was finished at 5:30 p. m. and the vehicle stored for the night. No repairs or changes whatsoever were made.

The second day the same routes were gone over, but stops of fifteen seconds' duration were ordered. The start was made at 9:12 a. m. and the run to Kingsbridge, as on the previous day, was entirely without incident. Seven ordered stops were made, two of which were accomplished under rather difficult conditions, viz., at 121st street on a down grade of 6 per cent. (came to rest in a few feet by shutting off steam, applying brake and reversing engine), and at 132d street on an up grade of 7 per cent. (came to rest in a few feet by shutting off steam. On the start off the engine had to be reversed slightly to get an advantageous point of stroke.) All the other stops were accomplished by slightly reversing the engine or using the brake. At Kingsbridge water was taken on and the fire cleaned. The trip back to Fifty-eighth street was again without incident, everything working splendidly. We arrived at 12:27 p. m., having made seventeen ordered stops and starts for this stage without difficulty. Water was taken on, the fire cleaned and the final stage begun at 1:30 p. m. Eight stops were ordered for this stage and all were made without difficulty. No involuntary stops were made and Fifty-eighth street was reached as the final stopping place, after covering 60 miles in two days without the slightest mishap, repair or derangement of parts. Time, 3:12 p. m.

REMARKS.

To the rubber tires on this vehicle is largely due its success. The set cost $400, have run about 3,000 miles and are still in good condition. They would have to have a life of at least 12,000 miles to be reasonably profitable.

The vehicle does not start quite as readily or as quickly as a team of horses, although it is very desirable that it should.

The gears had become somewhat worn, causing considerable noise when the wagon was driving engine (steam shut off.) Better accommodations should be given the driver.

Some slipping of the drivers was noticed on grades covered with wet asphalt pavement.

As a whole the performance of the vehicle was excellent, and thoroughly practical.

SUMMARY.

Weight of vehicle without load but with full supplies, approximately pounds	10,225
Paying load, pounds	4,250
Ratio of paying load to weight of vehicle equipped, per cent	41.5
Distance traveled per day, miles	30
Ton miles per day	63.75
Coal consumed first day, pounds	220
Coal consumed second day, pounds	180
Average coal consumed, pounds	200
Water used first day, pounds	1,696
Water used second day, pounds	1,320
Average water used, pounds	1,508
Water presumably evaporated per pound of coal—	
First day, pounds	7.7
Second day, pounds	7.4
Average, pounds	7.5
Cost of fuel per day, anthracite, at $5 per ton—	
First day	$0.55
Second day	.45
Average	.50
Cost of fuel per ton mile of paying load—	
Average both days, mills	7.8

FIRST DAY—FIRST STAGE.

Start, 9:21 a. m.

Arrived Kingsbridge, 11 a. m.

Started Kingsbridge, 11:12 a. m.

Arrived Fifty-eighth street, 1:17 p. m.

Total time consumed, 3 hours 56 minutes.

Average miles per hour, 5.08.

Maximum pressure attained, 220 pounds per square inch.

Minimum pressure attained, 130 pounds per square inch.

Average pressure obtained from 32 readings, 179 pounds per square inch.

Jet in stack to force draught—number of times used, 8.

Average length of time in operation, 4 minutes.

Average rise in pressure due to forcing draught, 26 pounds per square inch.

Coal fed to boiler—number of times, 9.

STOPS.

	Number of Times.	Average Time.
To change gear	3	10 sec.
To clean fire and take water (1)	2	16 min.
Involuntary	0	0
Traffic	0	0
Total	0	32.5 min.

FIRST DAY—SECOND STAGE.

Start, 2:58 p. m.

Arrive Fifty-eighth street, 5:30 p. m.

Total time consumed, 2 hours 32 minutes.

Average miles per hour, 3.9.

Maximum pressure attained, 190 pounds per square inch.

Minimum pressure attained, 150 pounds per square inch.

Average pressure obtained from ten readings, 171 pounds per square inch.

Jet in stack to force draught—number of times used, 4.

Average length of time in operation, 3 minutes.

Average rise in pressure due to forcing draught, 22 pounds per square inch.

Coal fed to boiler—number of times, 4.

STOPS.

	Number of Times.	Average Time.
To change gears	0	0
To clean fire	0	0
To take coal (was not used, did so as precaution)	1	10 min.
Involuntary	0	0
Traffic	14	11 sec.
Total		12.5 min

SECOND DAY—FIRST STAGE.

Stopping and Starting—

Start, 9:12 a. m.

Arrive Kingsbridge, 10:37 a. m.

Started Kingsbridge, 10:48 a. m.

Arrive Fifty-eighth street, 12:27 p. m.

Total time consumed, 3 hours 15 minutes.

Average miles per hour, 6.15.

Maximum pressure attained, 220 pounds per square inch.

Minimum pressure attained, 140 pounds per square inch.

Average pressure obtained for 34 readings, 179 pounds per square inch.

Jet in stack to force draught—number of times used, 12.

Average length of time in operation, 5 minutes.

Average rise in pressure due to forcing draught, 26 pounds per square inch.

Coal fed to boiler—number of times, 6.

STOPS.

	Number of Times.	Average Time.
To change gears	6	10 sec.
To clean fire and take water	1	11 min.
Involuntary	0	0
Traffic	0	0
Ordered	17	15 sec.
Total		16 min.

SECOND DAY—SECOND STAGE.

Stopping and Starting—

Start, 1:30 p. m.

Arrived Fifty-eighth street, 3:12 p. m.

Total time consumed, 1 hour, 42 minutes.

Average miles per hour, 5.88.

Maximum pressure attained, 200 pounds to the square inch.

Minimum pressure attained, 160 pounds to the square inch.

Average pressure obtained from 20 readings, 182 pounds per square inch.

Jet in stack to force draught—number of times used, 4.

Average length of time in operation, 3 minutes.

Average rise in pressure due to forcing draught, 17 pounds per square inch.

Coal fed to boiler—number of times, 3.

STOPS.

	Number of Times.	Average Time.
To change gear	0	0
To clean fire	0	0
To take coal	0	c
Involuntary	0	
Traffic	4	1
Ordered	8	
Total		min.

The Morgan Steam Truck.

The heavy Morgan truck, entry No. 9, although seriously handicapped by a piece of bad piping in the feed water system, made an excellent performance in other respects.

From the starting point to Kingsbridge, on the morning of the first day's run, everything progressed smoothly. Then the pump connection began to leak and a stop had to be made while a new piece of pipe was brought from downtown. This fitted in place, a satisfactory run was made back to the club headquarters, the steep hill on 230th street being climbed backward after several unsuccessful attempts owing to the greasy condition of the road. The downtown trip was also made in good shape. The next morning another section of the old pipe gave way and more trouble was experienced, it at last becoming necessary to short circuit the regular feed water pump out of the feed water system, using an auxiliary steam pump to feed the boiler. This necessitated pumping cold water direct into the boiler, the feed water heater being so arranged as to operate only in connection with the other pump. The result was a coal consumption of 1,200 pounds for the second day, against 400 for the first, and a lengthening of the running time by over three hours.

MORGAN TRUCK MEETING WITH DIFFICULTIES ON 230TH STREET HILL.

WEDNESDAY.	Left.	Arrived.
First stage.........	9.09	3.38
Second stage......	3.18	8.10
THURSDAY.	Left.	Arrived.
First stage........	9.00	5.09
Second stage......	5.52	10.33

Weight, 9,000 pounds; load, 6,000 pounds.
Length, 18 feet 6 inches.
Width, 6 feet 6 inches.
Height, 8 feet.
Tread, 5 feet 6 inches.
Wheel base, 10 feet.
Wheels, 34 feet and 43½ feet, wood artillery, plain bearings.
Tires, 4½ inches and 6 inches, steel.
Fuel, hard coal, 700 pounds.
Water, 135 gallons.
Frame, channel steel.
Reaches, 2¾ inches tubular.
Boiler, 129 square feet heating surface. plain tubular upright, 30 inches by 5 feet.
Engine, cross compound, 20 horse power or 30 horse power; can be worked simple.
Valves, piston; Stephenson link motion.
Gear, 10 to 1 and 20 to 1, enclosed in oil; engine enclosed in oil.
Chain, double Diamond Roller.
Inspirator.
Klinger gauge.
Springs, full elliptic front, half elliptic rear, sliding dovetail; universal coupling on engine shaft.

The Union Motor Truck Company's Baggage Express, No. 3.

BY P. M. HELDT.

This vehicle was originally entered in the third class, in which it would have had to carry a load of 3,500 pounds, but it was found that this load was too much for the springs. The wagon was therefore transferred to the Miscellaneous Class, in which it was required to carry a load 50 per cent. of its own weight only. The vehicle weighed empty 4,525 pounds and with load 7,235 pounds. The net load was therefore 2,710 pounds, or about 60 per cent. of the weight of the wagon. In addition the wagon carried three passengers—the driver, a mechanic and an official observer.

After the vehicle had been weighed at the official garage, at Eighth avenue and Forty-ninth street, and rubber buffers put under all the springs, we proceeded to the starting point on Fifty-ninth street. Here the gasoline and water tanks were filled and some of the parts given a final oiling before the start. Some particulars may here be given about the construction of the wagon.

The driving power is derived from a four cylinder horizontal gasoline motor of 5 inches bore and 6½ inches stroke. The motor is arranged on a very strong underframe of section steel which is pivotally connected to the front axle. The rear axle is a live axle. The most interesting feature of the wagon is the transmission gear, which is of the variable throw type. The flywheel of the engine is provided with a radially movable crank pin which is connected to a piston in a cylinder extending radially through the flywheel. A coiled spring in the cylinder tends to force the piston and crank pin to the central position, so that the pin simply turns around its own axis. By means of a plunger pump oil may be forced into the cylinder below the piston, and the piston and crank pin thus moved outwardly against the pressure of the spring. The pump is located on the opposite side of the engine from the flywheel, and the oil has to pass all the way through the engine crank shaft. When the operator desires to increase the speed he throws the oil pump in gear with the engine by means of ratchet clutch. This pumps oil into the flywheel cylinder and moves the crank pin outwardly. When the speed is high enough the pump is unclutched. When it is desired to stop the car a relief valve is tripped which lets the oil out of the flywheel cylinder and allows the spring to bring the crank pin back to the central position. The amount of increase in speed depends, therefore, upon the length of time the pump is being driven by the engine. To the crank pin on the flywheel connect a number of rods which transmit the power to the rear axle by means of roller ratchets.

The wagon body is placed rather high above the under frame, so that it will not strike any part of the machinery when the springs are fully compressed.

The wagon started from Fifty-eighth street at 9:28 and went up Fifty-ninth street and Central Park West. It went along at a good speed and had no difficulty on the hills, though it necessarily went up the steeper ones at a slow pace. The long grade on Amsterdam avenue is certainly a severe test for any fully loaded wagon, yet the machine reached the top without trouble, though not without boiling the water. A number of times when the gearing was too high for the motor power the operator stopped the car a moment and let the engine gain speed, something this system seems to require.

The first real stop we had on the short and steep grade just beyond the outer control. When quite near the top the wheels of the machine dropped into a hole in the road and the engine stopped. After the engine was started again the machine easily climbed the rest of the distance. The time of this stop was ten minutes. Just after having passed this hill the driver brought the vehicle to a stop and put some grease in the cup on the crank pin of the transmission, this bearing seeming to run hot; time, six minutes. When back on Fifth avenue a tube forming a connection in the reverse operating mechanism broke off short where it entered the connection fork. The reversing gear was tied down with wire, so

it would not jar into action, and the trip was proceeded with. Time loss, nine minutes. A little later a hose in the water system came off and caused the loss of considerable water. But as we were then only about twenty blocks from the finish it was decided, after the connection was remade, to continue without replenishing the water supply. It appeared that the vent in the water tank was too small and that steam collected in the water system, which finally forced the hose off the pipe end. The hose was simply slipped over the smooth end of the pipe and secured by a clamp ring. This incident caused us a loss of time of seven minutes.

We arrived at the end of the first stage at 12:40, making 3h. 12m. total time for the 20 miles, or 2h. 40m. net time after deducting the aggregate time of the four stops, 32m.

During the compulsory stop of forty-five minutes at the end of the first stage, 4 gallons of gasoline were added, the water tank refilled and the tube in the reversing connection repaired. Owing to the loss of time occasioned by the repair, the wagon started about twenty minutes late on the second stage. During this stage, the route of which led through the downtown district, the engine did not work nearly as well as in the morning. The cooling facilities seemed to be inadequate for work of this nature, and the water was constantly boiling. Not far from the start the engine stopped, and two minutes were lost before the machine was running again. In Union square a bolt dropped out of the steering knuckle connection and released one of the steering wheels, thus making the machine unmanageable. Fortunately it was running at a slow rate of speed and the driver immediately applied the brake, but before the wagon came to a stop it ran against an electric truck standing at the curb, without doing any damage, however. The bolt was found in the street about a half a block back, but the nut was lost. There was a hole for a split pin through the end of the bolt, but evidently either no pin had been put there or else it had not been properly spread and had come out. The repair was made in ten minutes.

Four more stops were made during this stage, one of fifteen minutes for examining a spark plug, and three of one, three and eight minutes respectively for oiling the crank pin. As stated above, the engine did not develop its full power during this stage and no very good time was made, the machine reaching the control at 4:22.

After the compulsory stop of ten minutes the third stage was started upon, over the same route as the second stage. We had not gone very far when a fierce downpour commenced, fortunately of short duration. On Eighth street, during the outward run, the engine stopped, and no amount of cranking would start it again. After testing the dry batteries and other experiments it was found that the gasoline tank was empty, which was a surprise, as the tank had been filled at noon and only 4 gallons had been used during the 20 miles run in the morning. The driver and mechanic then went in search of gasoline, and finally procured two 5 gallon cans at a place on Sixth avenue. This stop lasted 1 hour and 34 minutes.

By this time the streets were quite clear of traffic and pretty good time was made when the engine developed full power. It got hot again, however, and one more stop was necessary to oil the crank pin and another to replenish the water supply. The former consumed five minutes and the latter thirty minutes, the water having to be collected from a slowly running drinking fountain. The wagon arrived at the control at 9 p. m. and was put up at the official garage half an hour later.

SECOND DAY.

On May 21, after having taken on 6 gallons of gasoline and 4 of water, wagon No. 3 started away at 9:18. The engine ran nicely and good progress was made, except on the hills, when the operator geared the machine down very low. At the top of the first hill, on 110th street, the water was boiling, and as a consequence the hose blew off again. Putting it back in place and adding three bucketfuls of water took fourteen minutes. The same thing occurred at the top of the second hill, the long Amsterdam avenue hill, when two and one-half buckets of water were added and twenty minutes lost.

The stops required by the rules were made all along the route in this stage and the machine was managed quite easily.

At the crossing of Broadway and Amsterdam avenue, after the stop indicated for that place had been made, the vehicle refused to start when the power lever was thrown over. The mechanic at once divined the cause—the oil had leaked out of the crank pin operating system. Some heavy cylinder oil carried along and some other oil purchased at a nearby hardware store was poured into the system and the journey resumed. Time lost, fourteen minutes.

All the stops indicated on the map were made as far as 181st street. In running down the smoothly paved decline near 195th street, at perhaps 8 to 10 miles per hour, a chicken was seen running across the road. The operator turned the car to the right, in the direction in which the chicken was running. A moment later, getting near the curb, he turned the other way, but the car seemed to turn much faster than the movement of the steering lever accounted for; the rear part of the machine was noticed to slew around and a moment later the whole machine toppled over, fortunately without causing any serious accident to any of the occupants. The motor was still running when the machine lay on its side, but was promptly shut down by the mechanic. This ended the run of No. 3.

The Herschmann Truck, No. 6.

By Charles E. Lucke, Ph.D.

This truck, one of the most interesting entered, through a series of misfortunes, due chiefly to its unfinished and untried state, left what at first glance seems to be a record of very poor performance. The fact that it took about six hours to run five miles and did not get back till next day is, however, no condemnation of the truck as a whole, but rather of a few specific details easily located, and, it would seem, as easily remedied. The vehicle had never been run until the night before the trial, and then moved only from the Brooklyn shop to the storage station. Some parts were yet unfinished, and everything was untried and out of adjustment, a serious matter in a steam plant. The weight of the truck unloaded was 12,500 pounds, and loaded with a block of stone 24,500 pounds.

A fire tube boiler located between the front seats is built with a flanged and bolted head sheet carrying the upper ends of the bank of five-eighth inch vertical copper tubes. This was adopted to facilitate repairing. Coal is fed from the top through a central flue; egg or nut sizes were used, about 450 pounds being carried in the bunkers. This boiler supplies steam to a horizontal compound engine fitted with a starting bypass. The engine drives the truck through one of the speed change series of gears, changes of gears being made while at rest. Reversals are accomplished by the engine valve gearing. An automatic feed pump driven by the engine parts is piped to draw water from the 180 gallon tank next the boiler. An auxiliary independent "American" pump is provided to supplement the automatic feed. It should be noted that in the event of failure to operate on the part of the independent steam feed pump when the truck is at rest it becomes necessary to throw the engine out of gear and to operate engine and feed pump together, which is rather bad, considering the great friction loss involved. It was remarked that at rest this friction of engine and feed pump was sufficient to generate considerable electricity, which, of course, is stored, as the wheels are insulated, and several times a most uncomfortable shock was experienced.

On arrival at the Forty-ninth street storage station, at 7:30 a. m., steam raising had already begun with a wood fire, the gauge showing 20 pounds. At 7:40 coal was fired, and by 7:45 the steam gauge showed 55 pounds. By 8:02 the steam pressure had risen to 220 pounds, and the gauge glass showed 7 inches of water. By heavy coaling the boiler chilled and the pressure fell to 155 pounds, rising later from the brightening fire to 225 pounds at 8:10, when the safety blew. More coal brought the pressure down again to 145 pounds at 8:13, but it rose again to 200 pounds at 8:16, when the station was left for the starting point with a total load of 12½ tons. At 8:14 the Morgan truck left

Some of the Participants in the Commercial Vehicle Contest. Taken on the Morning of the First Day's Run.

and as she made a turn her metal shod drivers were observed to slip not a little. This was also observed next day as this machine backed up a macadamized hill at Kingsbridge.

At Eighth avenue the steam pressure was 220 pounds, and at Seventh avenue it had risen to blow off 225 pounds. A quick stop was made to permit a trolley car to pass, the stop being accomplished as easily as the subsequent start. While running here the gear system made considerable noise, particularly on the Belgian block pavement, where the driver pull on the engine was so unsteady. In fact, it was observed that whenever, owing to change of grade, the engine picked up the load or the truck began to drive the engine by gravity, the noise considerably increased. At high speeds, too, the noise was greater than at low speed. In the passage to Fifty-eighth street and Fifth avenue (which was reached at 8:30 with 160 pounds steam and 2 inches of water in glass) many horses took fright—horses, too, that took

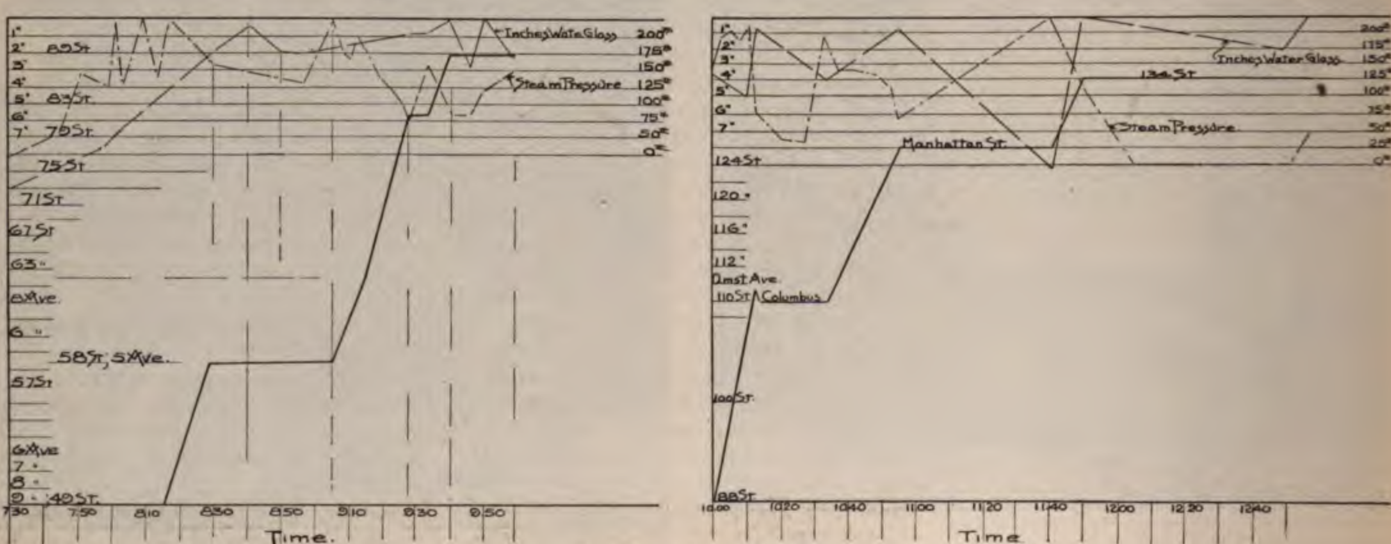
and in addition that the steering gear, while very positive, was slow in acting, having a total range of eleven turns on the hand wheel, at least five or six being necessary to turn a corner in the street centres.

The start was made at 9:06, without trouble this time; steam pressure, 220 pounds. From here to the end of the run, and, in fact, up to this time, the steam pressure and water level continually changed, grades having a very noticeable effect, for 180 pounds at Sixth avenue fell to 165 pounds at Seventh avenue, from a slight up grade on asphalt. The down grade to Eighth avenue permitted a rise to 200 pounds, while another up grade from Sixty-sixth street to Sixty-ninth street on the asphalt of Eighth avenue caused a pressure drop from 170 pounds to 135 pounds. This was followed by an almost level stretch to Seventy-fourth street, but still the steam fell, being now 120 pounds. A rise to Eighty-second street pulled the pressure down to 70 pounds, where it was necessary to stop at 9:27 from this cause.

per minute, about the same as at the start. While waiting more coal was fired, making the fire quite black and keeping the pressure down at the 80 pound mark. It was noted that in firing the flue through which coal was fed from the top became clogged by a large piece, and a crowbar was necessary to fire it again.

By 9:54, twenty-one minutes after having stopped feeding, the glass showed low water, having lost 1 inch in seven minutes standing still, so it became necessary to again start the engine to feed up. The latter was kept going till 9:59, four minutes after which 2½ inches showed, and at 10 a. m., with 145 pounds steam pressure, a new start was made. The fresh fire and easy grade permitted a rise of pressure to 190 pounds at Ninety-fourth street, 200 pounds at 100th street, which was pulled down to 180 pounds at 104th street by an up grade.

Turning into 110th street the gauge showed 200 pounds and the glass 5 inches; a change of gear to low speed was made



Curves of Performance.

no notice of a trolley or a pleasure automobile. Whether this was due to the smoke and steam from the stack (which was slight, by the way), to the noise of the gears or to the size of the vehicle, one cannot say.

Backing down to the water barrels in Fifty-eighth street to fill the tanks afforded an opportunity to observe the necessity for frequent reversals of the engine in getting started. But once caught the start was very steady and positive whether up or down grade.

By 8:46, after filling the tanks, the water had fallen so low in the glass as to necessitate feeding while waiting for the starting signal. The independent feed was out of order, so the engine had to be thrown out of gear to feed the boiler by the automatic pump, a decidedly wasteful method. In five minutes about 2½ inches of water was fed, while standing, by the method noted, steam pressure being 130 pounds. At 8:58 position in the starting line was taken, and in moving up it was again noted *that several trials* were necessary to start.

Here occasion was taken to tighten the drip cock from the cylinders, which tended to open itself; coal was fired and steam pressure waited for. By 9:33, after a stop of six minutes, a start was made with 166 pounds of steam, which was again pulled down to 106 pounds at Eighty-fifth street by a slight up grade. Eighty pounds at Eighty-seventh street was sufficient ground for another stop at Eighty-ninth street at 9:40, especially as water level also had dropped almost out of sight in the glass. It was evident that the boiler not only loses steam pressure, but also water level, and the first deduction would be that the unit was too small, but as this also happened on a standstill it must be attributed in most part to leaks. It will be noted as time goes on that this rate of losing steam increased, and toward the end it was almost impossible to feed enough water to keep the level up while standing.

To raise the level at this stop the engine was started out of gear, and in six minutes 3 inches of water appeared in the glass, the rate of supply being about one-half inch

during a temporary stop for the purpose, and the up grade attacked. By Morningside Drive crossing the gauge had fallen to 100 pounds, while at a point about one-quarter up to Amsterdam avenue, a fairly heavy hill, the pressure had fallen to 80 pounds, at which the vehicle stopped, with throttle wide open.

Just here a very important detail was noted. On stopping, the gears were thrown out and the truck immediately began to back down hill by gravity, the brakes being unable to prevent, while attempts to throw in the gears while in motion failed. It was found here, as again later, that the gears were necessary to a stoppage on hills, and even on a steep down grade steam must be kept in the cylinders in the ahead position to prevent a stoppage. In short, almost as much steam is necessary going down hill as on the level. An accident on 110th street hill, while falling backward, was prevented only by throwing a stone under the driver, though not until it had gone 100 feet or more.

At 10:13, immediately after the stop, the

engine, out of gear, was started to raise the water level, which showed only 1 inch in the glass. Coaling brought the steam pressure down to 40 pounds. A stop of twenty minutes brought conditions up to those necessary for a start, which was made at 10:33, with steam pressure at 200 pounds, from Morningside Drive. The grade to Amsterdam avenue and up to 117th street, the top of the hill, brought the pressure down to 120 pounds. The steep down grade to Manhattan street, it was thought, would allow pressure to rise for climbing the opposite big hill, but the steam necessary for the down grade lowered the pressure to 75 pounds, and called for another stoppage at 10:55. Here coal was fired heavily and the engine run free, raising the water level to 9 inches, and at 11:41, after waiting forty-six minutes, the start up the big Manhattan hill was made, with 225 pounds steam pressure. The hill was taken quite easily for a time, but falling water and steam pressure necessitated another stop at 134th street, about three-quarters up, at 11:50 a. m., the engine stopping with throttle wide open and the gauge showing 120 pounds.

The water level was out of sight by this time, and the engine started free to pull up. After a trial of five minutes and no water appearing, things began to look very serious, particularly as the water tanks were about empty, 180 gallons having been used. Here, to avoid a possible explosion from hot surfaces and low water, the fire was drawn at 12:05. From this time until 1:34, when the trip was resumed, or during about one and one-half hours, the machine stood while the steam pressure fell. About 25 gallons of water were put in the tanks and 100 pounds of coal taken in the bunkers. A fresh fire was started with ten bundles of wood at 12:50, with 2 inches of water in the glass. While the steam pressure rose to 60 pounds all the water disappeared from the glass, leaving at the rate of 1 inch in three minutes under a mean pressure of 30 pounds. The engine was again started for feeding, and at 1:34 a start was made with 3½ inches in the glass and steam pressure 210 pounds.

A stop was made at 1:42 in 140th street to fill the water tanks, at the hook and ladder company, when the water level had again disappeared below the glass. It took thirteen minutes' running of the engine and feed at rest to raise the level to 3 inches, or at the rate of 1 inch in four minutes. The gauge showed 130 pounds at the time. A run was made to 145th street for coal, of which five bushels were taken on. We did not leave here till 2:36. After reaching 154th street, a run of nine blocks, the steam pressure had fallen to 110 pounds and the water level was again out of sight. It took eighteen minutes to raise 1½ inches of water. A short run to 160th street, beginning with 200 pounds and ending with 150 pounds, and no water in sight, brought the run to an end at 3:06 p. m.

Here it was decided that as the loss of water and steam pressure was growing more serious, and what leaks there were — there surely must be some—were getting worse, at the rate of increase it would be difficult even to reach the starting point before dark.

A return was made down St. Nicholas avenue at 3:30 with 3½ in. of water showing and 160 pounds on gauge. A run of two blocks down grade brought the steam down to 40 pounds and the water level to one-half inch. Here a stop was made for water and the feed started, the run being resumed at 4:12 p. m. with the safety blowing and 3½ inches in the glass. At this point the observer left the vehicle to report. The truck never got lower than 110th street that night, when mechanics made such repairs as were possible. Next day the machine was started down town, reaching Fifty-ninth street about 12:45 on the way to the Brooklyn shops.

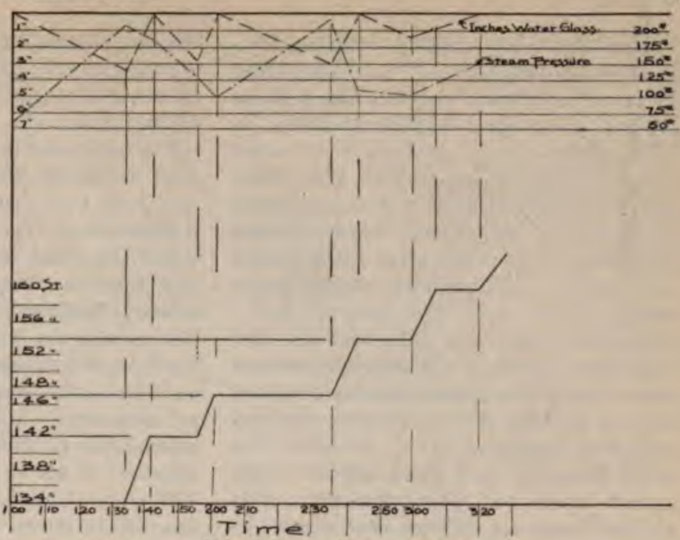


Diagram of Performance.

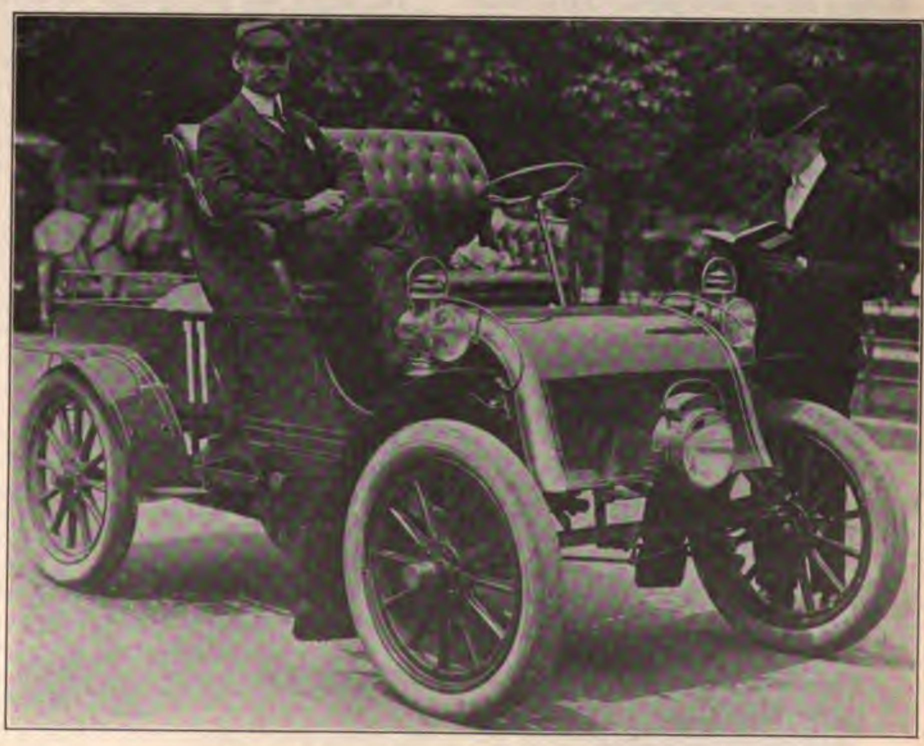
A graphical log is presented which shows in a very clear way the distance traveled, stops and speed, water level and steam pressure throughout the run, and it will bear careful study in comparison with the test. The effects of coaling and grade on the steam are clearly shown, and the rate of change with time. It will also be possible to measure the leaks by loss of level on stops, and the rate of feed by the automatic pump at rest and in motion. It is believed that this graphical sheet will prove a valuable addition to a report, and furnish data in a form useful for reference.

Knox Delivery Wagon, No. 11.

By Joseph Tracy.

No. 11, in the Commercial Vehicle Trials, was a double cylinder machine, driven by its designer, Harry Knox. The machine carried 1,225 pounds of lead "pigs" to comply with the rules of the contest. The first stage on the first day's run was covered in one hour and twenty-five minutes, the driver taking advantage of the "Bailey" law, which allows 15 miles an hour where the houses are 100 feet apart.

This stage was covered without a single involuntary stop on both days. On the second day stops were made in accordance with the club rules. The machine came to a stand quickly and started promptly. The start made on the steep hill on Amsterdam



Knox Sixteen Horse Power Delivery Wagon.

avenue was very striking, the machine gaining headway without much apparent effort. This hill was the only place where the low speed gear was used, except in starting.

The second stage, below Fifty-ninth street, on the first day's run, was made in one hour and ten minutes, without a stop of any kind. The third stage (same route) was made in one hour with several "traffic stops."

On the second day (May 21) the first stage was covered in one hour and twenty-four minutes; the second stage in one hour and ten minutes, and the third in one hour and seven minutes.

On Broadway, near Prince street, on the second stage (on May 21) the driver stopped his motor and lost two minutes by accidentally throwing in his reverse, instead of the foot brake. This was the only stop due to trouble with the car.

The test was a convincing one of the air cooled type of machine, the temperature on both days being close to 100°. The motor did not show the slightest symptoms of overheating—it turned over freely by hand after the hardest run and stopped promptly when the switch was opened. In response to the writer's request Mr. Knox "let her out" on a level stretch on Amsterdam avenue and covered three blocks at 20 miles per hour, which is good for a delivery wagon weighing, with load, 3,550 pounds, exclusive of passenger and driver.

The machine was one of the new 16 horse power Knoxmobiles, which weighs 2,300 pounds. Some particulars of the machine are as follows:

The wheel base is 84 inches and the tread 68 inches. The front and rear wheels (wood) are of the same size, having twelve spokes each and fitted with 4 inch Dunlop double tube tires. Extra heavy Timken roller bearings are used. The front axle is of the standard Knox channel construction, but heavier than in the single cylinder runabout, and made from the Knoxmobile Company's special bronze alloy.

The back axle is made of a special axle steel on which one-half inch square by 5 inch steel keys are used. The differential is of the bevel type, having two pinions of 2 inch face and four pitch. The pinions and gears are drop forgings. The differential is enclosed and filled with grease. The springs are the same type as formerly used on the runabout, only heavier, with swiveled ends, relieving them from all twisting strains. They have six leaves 2 inches wide varying in thickness from one-quarter of an inch to seven-sixteenths. The channel frame, on which the body is secured, is fastened to the springs by six one-half inch bolts, three in each.

The steering is done by an irreversible wheel located on the left side. Provision is made for taking up lost motion on all joints on the steering system, except the pins connecting the ends of the drag link to the steering knuckles. The wheel is of the tilting type, and makes one and one-half turns to move the front wheels from extreme right to left, and the post is a solid 1 inch rod. The stubs or pivots run on three-eighth inch steel balls. Motion is transmitted from the hand wheel to the front wheels by means of a nut and screw system, having coarse V threads. The nut is split and provided with adjusting screws for taking up wear.

The frame on which the engine and transmission are mounted is of angle steel 2x2x5-16 inches. The joints at the corners of the frame are re-enforced and hot riveted. The body is secured thereto by six one-half inch bolts, and can be removed without disturbing the mechanism.

The motor has two opposed horizontal cylinders having a stroke of 7 inches and a bore of 5 inches.

The exhaust valves and fans of both cylinders are driven by a single half-time shaft. The inlet valves are automatic.

A single vaporizer supplies both cylinders.

The ignition is of the jump spark type, having one coil and one mechanical interrupter on the lay shaft, and having both ignition plugs in series on the secondary, giving, of course, an idle spark in one cylinder, but with the so called advantage of the external spark gap.

The flywheel is 20 inches in diameter and weighs 180 pounds.

The main bearings are 2x5 inches and the crank pin bearings are 2¼x3 inches. Two compression grease cups are used to lubricate the main bearings and crank pins. There are 2,000 cooling pins ¼x2 inches in each cylinder. The pistons have three one-half inch cast iron rings. The cylinders and heads are cast integral. The connecting rods are bronze of H section, the top trough in rod serving to convey oil to the piston pin. The engine shows 55 pounds compression per square inch cold, the air fans are geared 6½ to 1 on the cam shaft.

The transmission is the planetary system, giving two forward speeds and one reverse. The ratio is 3 to 1 on the high, 9 to 1 on the low and 12 to 1 on the reverse. The clutches and brakes are double acting.

The emergency brake on the back axle is an internal expanding ring, operated by a hand lever on the left side of the carriage. The gasoline tank holds 18 gallons and is under the left hand front seat. The machine may be fitted with a "tonneau" or "surrey" body as desired. The dash has the well known folding front of the ordinary "Knoxmobile," making a convenient place to carry tools and extra parts or one or two extra passengers if desired, the machine having ample power to carry six people. There is plenty of room for the passengers' legs, both on the front and rear seats. The easy riding springs make the machine so that it does not tire one, even on a long trip.

The Knox Performance.

The performance of the two waterless Knox delivery wagons was probably the most interesting feature of the test.

A good many people have been skeptical in regard to the efficiency of the Knox system of air cooling, especially during extreme hot weather and under a heavy load. The record of these two vehicles in making their full two days' run without a single stop finally sets these fears at rest. Both vehicles completed the test without a hitch of any sort in the mechanism, the only trouble encountered being on account of defective inner tubes in the tires.

There was no trouble experienced from preignition, and the engine stopped promptly upon the throwing off of the ignition at the end of each run.

The Blaisdell Steam Delivery Wagon.

By A. L. Clough.

The writer was assigned to vehicle No. 14, the steam delivery wagon built by Blaisdell & Co., of Brooklyn, N. Y., and entered in the second class. It carried a dead weight of about 1,800 pounds. There was some delay in starting on account of the faulty action of the vaporizer, and in fact hard luck seemed to pursue Mr. Blaisdell most unrelentingly. For some reason or other the gauge glass refused to show the amount of water actually in the boiler, and the main burner did not act properly at all. The operator was forced to run without any knowledge of how much water he was carrying and several times the boiler ran dry, but as it was of the water tube variety no damage resulted.

It soon became apparent that the vehicle was not going to climb the hills successfully, and after a number of fruitless attempts to surmount the grade of Amsterdam avenue the woodwork caught fire, and Mr. Blaisdell decided to retire from the contest, much to his own regret and with the sincere sympathy of the official observer.

This vehicle has the peculiarity of its boiler being placed in the dash or bonnet. The double engine is in its usual position and in other respects the vehicle does not vary from ordinary practice. There seems no good reason why it should not operate successfully if all the adjustments were properly made.

The Waverley Electric Delivery Wagon.

By Harry B. Haines.

I had been assigned to vehicle No. 4, which was listed as a stake truck propelled by gasoline, but the machine did not put in an appearance, and at the last moment I was assigned to car No. 5, a natty Waverley electric delivery wagon, the only one of this motive power in the run, it having been entered by the New York agents of the International Motor Car Company. The car was operated by J. P. Kirkpatrick.

We lined up with the other contestants, and were started off at 9:18 o'clock. The wagon I was riding in, I was informed, was originally intended to carry a load of 700 pounds, but in order to get it entered in the contest it had been loaded down with a dead weight of 1,230 pounds, composed of two barrels filled with broken stone.

Those entering the rig had taken advantage of the right to tack signs on it, and one representative, overzealous in his efforts to get the sign in a prominent place, drove several nails into the highly polished side panels, scarring them badly. The machine was fitted with two motors giving 5 horse power, and the batteries at the start read 84 volts on open circuit and 80 volts on closed circuit at a 30 ampere discharge.

The run over the first 20 miles was absolutely uneventful with the exception of the fact that we passed car No. 6, a steam truck, stalled at West Eighty-first street and Central Park West, apparently troubled by an overheated rear axle, despite the apparently generous bearings and grease cups provided for lubrication.

Car No. 9, the Morgan Motor Company's steam truck, was passed while ascending the grade at Jerome avenue, running very slowly, with observer and operator perspiring freely.

The operator of the electric I was in ran the machine very carefully, allowing it to climb hills slowly, invariably running in the car tracks in order to avoid the expenditure of the extra power that would be taken up by bouncing over the cobble pavement. The machine proved to be a great coaster, and sailed down hills with the power shut off at a 20 mile an hour clip.

We completed the first stage at 11:41 a. m., the entire run having taken two hours and twenty-three minutes, of which one hour and fourteen minutes was expended in reaching Kingsbridge Station. We were fourth in, the two Knox entries and the Mobile delivery wagon having finished before us. The heavy steam and gasoline trucks straggled in an hour or so later, the observers on the former vehicles suffering perceptibly from the roasting of the sun and the heat of the boilers.

Forty-five minutes was allowed for lunch, and our machine was at once run over to a storage station and put on charge. The batteries at the finish of the first stage had read 80 volts on open circuit and 78 volts on closed circuit, with an ampere discharge of 25. The operator of the car figured out that in running the 20 miles we had taken about sixty ampere hours out of the battery, an equivalent of 4,800 watt-hours. He stated that the full charge had cost him about $1. The batteries were left on charge for twenty minutes, and then registered 83 volts on open circuit, 80 volts on closed circuit at a 25 ampere discharge. About 1,000 watts had been put in at a cost, the operator said, of about 7 cents.

We were started on the second stage at 12:26, and were to run from the clubhouse to the Battery and return by way of Fifth avenue, Broadway, Canal street, Laight street, West street to Battery place, and then up Broadway to Twenty-third street, and up Fifth avenue to the clubhouse.

We reached Canal street without a stop despite the heavy traffic, but from there to the end of this stage we had six involuntary stops owing to cars or wagons blocking the road. We had two rather narrow escapes from collision as a result of the wagon skidding in coming out of the car tracks. The operator experienced some difficulty in steering the machine over the rough cobble pavement, owing to the fact that the weight on the front wheels had a tendency to drag the centre steering lever out of his hands, and at times gave him considerable trouble to keep it straight. Wheel steering would probably have prevented this.

We completed the second stage without difficulty at 1:58 p. m., it having taken us an hour and thirty-two minutes to run the 10 miles, of which fifty-nine minutes was taken up in reaching Battery place.

We were allowed ten minutes' rest, and were then started off on the third and last stage of the first day's run, which was a repetition of the course from the clubhouse to the Battery and return.

Our batteries had been running rather low, the numerous stops and starts made necessary by the heavy traffic having exhausted them more rapidly than the straight run had done, and when, at Fulton street and Broadway on the way home, they gave signs of running out, it was thought advisable by the operator not to take any chances of being stuck, and at his suggestion we left the prescribed route at Duane street, and ran down to the charging station of the Edison Company on that street.

CHARGING UNDER DIFFICULTIES.

We managed to reach the place all right, and once inside explained the situation to the attendants there. There were two Columbia electrics on charge, but the plugs used on them were entirely different from those needed for our rig, and were of no use to us.

The young men in charge of the place were most obliging, but were unable to devise a means of giving the battery the "boost" we desired, and it looked for a time as though we would have to send for a tow after all.

Mr. Kirkpatrick finally took matters in hand, and sent out for two 10 foot lengths of heavy copper wire, and, scraping the insulation from the four ends, connected these up on the switchboard. He then cut two wooden plugs, and by means of these wedged the other ends of the wires into the slots for the charging plug on the machine.

The moment the current was turned on there was a flash of blue flame as the fuse burned out. A new one was put in, but this followed the first, and a third one was tried. Luckily this withstood the current, and much to our relief the batteries began to fill up. The reading at the time of the stop was 66 volts on closed circuit at a 24 ampere discharge. The batteries were left on for twenty minutes, and then registered 78 volts on closed circuit at 26 ampere discharge. We left the Edison station at 3:56 p. m., and finished the course at the clubhouse at 4:28 p. m., having had four involuntary stops, of which three were the result of traffic blocks and the fourth was made to charge the batteries.

The machine was then taken to the storage station and locked up for the night, the meter registering 75 volts on closed circuit at a 25 ampere discharge.

A number of the lighter vehicles entered completed the course before we did, but the heavy trucks had a rather hard time of it, and were still on the route at a late hour in the afternoon.

SECOND DAY'S RUN.

The completion of the first day's run saw

ten out of the twelve starters finish, machines Nos. 6 and 14 being forced to drop out of the contest. The remaining machines were in apparently good condition when they lined up at Fifty-eighth street and Fifth avenue for the start over the first stage of the second day's run. The powerful little electric got off in good shape, and completed the first stage without mishap, as it did all the other portions of the trip. Our batteries, which incidentally it may be interesting to state were Sperry batteries composed of forty cells, having a capacity of 100 ampere hours, and capable of propelling the wagon when loaded with the weight it was designed to carry, viz., 750 pounds, a distance of 40 miles, had been inspected carefully at the end of the first day's run, and despite the surprisingly large amount of work done they were found to be in excellent condition. No new acid was added as none was needed, and throughout the entire run not the slightest adjustment or repair was made, the only things that were necessary being the recharging of the batteries and the pumping up of the tires despite the fact that the wagon was overloaded by 500 pounds, and was given a grilling over rough roads and pavements that, to say the least, tested it in every joint and bearing.

It was 9:09 o'clock when we left the starting point, the batteries at that time reading 80 volts on closed circuit, at a 25 ampere discharge, 85 on open circuit. There were forty-six stops to be made on the first stage, and one of these was a most severe test for any wagon, as it required the machine to be brought to a dead standstill while ascending a 7 per cent. grade on Amsterdam avenue, at the corner of 132d street. The little 5 horse electric walked up the hill in good shape loaded down as it was, came to a full standstill for fifteen seconds, and then when the power was thrown in started off again without the slightest difficulty and climbed the grade, picking up speed at every revolution of the wheels.

We left the steam trucks far behind, and gave the gasoline wagons a bit of a brush to lose us, our speed being considerably faster than their low gears.

There were no mishaps of any kind during the morning, the behavior of the machine being excellent, and we finally completed the first stage at 11:40 a. m. The batteries at this time read 78 on closed circuit, at 25 ampere discharge, 80 on open circuit. We went at once to a storage station and put the batteries on current for forty-five minutes, during which time about 2,000 watt-hours were put in. After charging the batteries registered 84 volts on open circuit, 80 volts on closed circuit at a 25 ampere discharge.

The second stage, which was the run from the clubhouse to the Battery and return, was through the heart of the business section, and meant the continual stopping and starting of the motor to dodge wagons, besides the twenty-seven compulsory stops. We made during the day sixteen involuntary stops and innumerable slowing ups, making in all 116 full stops. The second half was finished at 1:58, the start having been made at 12:34. It took forty-four minutes of this time to reach the Battery. On the way down we followed a steam delivery wagon, entry No. 10, and while on West street saw this rig have a narrow escape from a serious collision with a heavy truck, the machine skidding and turning half around as the driver attempted to swing out of the car tracks. Luckily he stopped the machine quickly, and no damage was done.

At the finish of this second stage the batteries registered 80 volts on open circuit, 78 volts on closed circuit at a 25 ampere discharge.

After a ten minute rest we started on the third and last stage at 2:08 p. m., made our twenty-seven stops and threaded our way through the maze of carriages, trucks and cars back to the automobile club, where we finished at 3:32 p. m., the batteries then registering 76 volts on open circuit, 75 volts on closed circuit at an ampere discharge of 25. Despite the hard work they had done there was still energy enough left to have run 8 or 10 miles more, and under ordinary conditions I believe the batteries would have propelled the wagon with its normal load the entire 40 miles without recharging. In justice to the manufacturers I may say that the shortage of current on the first day was due to a misunderstanding as to the time to be allowed for luncheon, about ten minutes being cut off, so that the batteries could not be given as much of a charge as they needed. Had they been left on for forty-five minutes there would have been no trouble whatsoever.

After turning in my official report to the club's representative I spent a short time talking to the various operators whose cars had finished. From the operator of one of the Knox wagons who had been annoyed considerably by tire troubles I ascertained, according to his story, that his tires had not been punctured, but the hot asphalt pavement had melted the cement on one of his inner tubes twice, and the tube had parted in the middle, necessitating the jacking up of the car to put in a new one. The same operator stated that the asphalt was so soft from the heat of the sun that the weight of the wagon on the jack sunk it a quarter of an inch into the pavement.

Mobile Light Delivery No. 10.

By V. R. Loughead.

Entry No. 10, the light delivery wagon of the Mobile Company of America, went through the contest in a manner certain to establish the utility of the commercial automobile more firmly than ever. From start to finish on both days' run this vehicle hauled 775 pounds of pig iron and two passengers over the route at an even, steady speed, without repairs or difficulty.

Leaving the starting point at 9:12 Wednesday morning, the vehicle accomplished the 20 mile stage through Harlem and the Bronx in exactly two hours, without stopping even for a moment, except once at Kingsbridge for water. The two downtown stages, of 10 miles each, were also covered in good time—the first in 1h. 9m., the second in 1h. 14m.—the only stops being three that were due to traffic blockades.

In Thursday's run, the 20 mile stage, including forty-four specified stops, was made in 2h. 26m., while the two downtown stages, each including twenty-eight stops, were accomplished in 1h. 21m., and in 1h. 23m., respectively. On this day's run, six involuntary stops were occasioned by traffic, and the vehicle was stalled for a moment by low steam pressure, on the hill at Kingsbridge. Otherwise the run was without hitch or mishap.

Throughout the contest no tire troubles occurred, and the automatic water regulator, by which the use of a water glass is avoided, worked perfectly. Exactly ten minutes were taken both mornings in firing up.

For silent running, reliability and capacity to manœuvre quickly in crowded streets, nothing could have better met actual delivery conditions than the performance of this light steam car. Particularly on the two downtown stages, with their 20 miles of rough running, their fifty-six stops and the congestion of traffic met, one could not but wonder what the condition of a horse would be if forced to draw a like load over the same ground in twice the two and three-quarter hours taken by his mechanical competitor.

Of minor faults the vehicle developed several, all easily remedied, however. The worst was a whistling burner, which at times, especially in cross winds, wailed annoyingly, suggesting a readjustment of the atomizing nozzle and mixing tube. The arrangement and proportions of the inlet to the water tank might be changed so as readily to ascertain the amount of water in the tank; while the latter permits of no greater speed in filling than a gallon a minute. This means that nearly an hour is required to introduce the quantity of water necessary for a 40 mile run.

The running time summed up as follows:

	1st Stage. H. M.	2d Stage. H. M.	3d Stage. H. M.
Wednesday ..	2 00	1 09	1 14
Thursday	2 26	1 21	1 23

The fuel, oil and water consumption was:

	Water. Gals.	Gasoline. Gals.	Oil. Pts.
Wednesday	48	6¾	1½
Thursday	55	7½	2
Total	103	14¼	3½

At 18 cents a gallon for gasoline and 36 cents a gallon for lubricating oil, these items amount to about 2 cents a mile for gasoline and 3-16 cent a mile for oil. The water consumption averaged 1¼ gallons

COMMUNICATIONS.

Approves Our Stand on the Bailey Bill.

Editor HORSELESS AGE:

I desire to express my appreciation of the dignified and intelligent stand THE HORSELESS AGE has taken in connection with the discussion of the Bailey bill, both before and since its approval by the Governor. The hysterical clamor which appeared in certain of the daily papers, and also, I am sorry to say, in some of the magazines devoted to the automobile industry, probably did considerable harm to manufacturers and undoubtedly emboldened the enemies of the automobile, confirming in them the belief that a very strict and oppressive bill had been passed, which would enable them to harass and annoy automobilists at their pleasure. Amidst all of this noise it was extremely gratifying to be able to turn to one paper which did not lose its head, and could discuss the matter calmly and intelligently. Your paper recognized, as all the friends of the automobile did, that the bill had its objectionable features, but at the same time realized that if it was approved by the Governor it did not necessarily mean the death of the automobile industry. If injury has been done to the automobile industry, it was the result of this unfortunate and ill considered newspaper criticism, and now that the bill has actually become a law I venture to predict it will have no deterrent effect upon the production of automobiles or the enjoyment of the sport.

My own feeling has been from the outset that, although the bill contains some objectionable features, it will not prove a very objectionable measure in practice, and that if it should prove oppressive or unjust we shall be able to get very substantial and satisfactory amendments at the coming session of the Legislature.

I congratulate you on the stand that you have taken, which will largely increase your influence among automobilists, who in the main are people of education and intelligence, and prefer to have facts truthfully stated, and all matters in which they are interested discussed in a calm and rational manner.

W. W. NILES.

Misfortunes of the Union Motor Truck Entries.

Editor HORSELESS AGE:

The conditions which led to the failure of both the gasoline trucks entered by the Union Motor Truck Company in the Commercial Vehicle Contest to complete their two days' run were so peculiar and unexpected that I would like your thousands of interested readers to know something more concerning them than will be likely to be brought out by the simple report of the observers.

There were only three entries in the heavy class of gasoline vehicles, and our two were the only ones that, after weighing in and taking their load, were able to start in the contest. What they did the first day is a matter of record and will doubtless appear in your paper in due time. All that I desire to make clear is that the conditions of the contest, the character of the roadway or the weight of our trucks and load carried, had nothing to do with our troubles, except indirectly. It was a question of the "personal equation."

The men who drove the two trucks had never handled them except in the ordinary business of handling trunks and baggage about the streets of Philadelphia. Here they make from three to five trips a day, running out from Broad Street Station with varying loads, often returning light and waiting sometimes over an hour before getting another load. They had never had any experience in New York city and naturally felt ill at ease. More important, also, they felt the strain of competition and long hours of steady running, and each was naturally trying to outdo the other. Any man who engages in competitive trials of any kind knows the value of long experience.

Our object in entering these vehicles at this time was to show that the variable speed transmission which we employ would do the work of handling heavy loads, and therefore that is is possible and fully practicable to utilize the gasoline engine for heavy work. Our trucks have been doing this daily here in Philadelphia, and I feel that our first day's run in the contest showed conclusively that our roller ratchet and hydraulically moved crank pin is far superior to all forms of gear and chain transmission, and had the unfortunate accidents not occurred, as they did, I should not feel called upon to ask for your valuable space to explain how it happened.

The first accident occurred to our large stake truck loaded with bags of feed. The driver has been operating our trucks for some months, and is a careful and cool-headed man. He had been making extremely good time until he reached the steep short grade at 230th street that caused so much trouble for the other heavy trucks. The conditions there were peculiar. The hill was short, very steep, and there were two double track steam railway grade crossings at the bottom, guarded by safety gates and a warning bell. Two of these tracks were on a curve of such short radius that the outer rails were so elevated as to necessitate going very slowly in crossing. There was very little room to get under way before striking the grade, so the hill could not be "rushed" and had to be taken practically from a standing start. I personally saw one of the heavy steam trucks stall there several times, and finally get up by backing, and even then the roadbed was so bad and slippery that they had to put dry sand under the driven wheels. One driver got up all right the first day, but the second he failed by about 10 feet of reaching the apex.

With our system of transmission when the truck is going ahead it can be stopped on any grade, and cannot run back unless the rolls in the roller ratchet are purposely shifted into the reverse position by the driver.

In this case he should have taken his time and gradually worked the truck up the balance of the hill a few feet at a time, but he used bad judgment and decided to back down hill again. He then put the rolls in the reverse position and started backing down. His truck ran down rather more rapidly than he expected and his brakes hardly got a chance to slow the truck down before the warning bell right behind him rang and an express train came rushing around the curve. He lost his head, and threw his rolls into the go ahead position, with the result that he locked his rear wheels and threw the entire power of the 20 horse power engine against the inertia of this loaded truck.

The truck came to a stop so suddenly as to lift the front wheels off the ground, and this sudden and violent shock bent the crank shaft just enough to make it bind and stop the engine. Here was a sad example of the power of the roller ratchet; it cannot slip, and so the shock was tremendous. I regret to say bad judgment on the part of our driver was alone accountable for the accident, but to his credit let it be said that he found himself in a very awkward position in a very dangerous place. We took off the load of bags, let the bearing cool, loosened it up and ran the truck under its own power from 230th street to Fifty-ninth street and Fifth avenue without stopping, and then ran her to the Thirty-seventh street station of the Pennsylvania Railroad, where she ascended two channel irons laid from the ground to the top of a flat car at a grade of over 16 per cent. actually under her own power, and without a rope or hand to help her.

The accident to the second car is soon told, and the cause was more apparent even than the first and entirely inexcusable.

The driver was less experienced and anxious to outdo his rival, who was ahead. He was delayed by the water hose coming off his radiator pipe, and was trying to make up lost time on a long down grade. He was on a baggage truck with a short wheel base, only 6 feet and 6 inches, designed so to enable it to turn in the narrow streets of Philadelphia. When nearly down the hill at about 195th street, on a fine, smooth pavement, he lost control of the car. It lurched toward the right hand curb, and in his endeavors to straighten it out he lost his head and swung her to the left. The truck, skidding on the

dry pavement, started a rear tire. He applied the emergency brake, but the momentum was too great, and over it went on its side, throwing the driver and observer to the ground. Thus ended our opportunity to finish the contest and complete the demonstration of the superiority of our power transmission, in which we have more confidence than ever.

I think your numerous readers will agree with me that these accidents were in no case due to faulty construction or lack of ability of our trucks to do their allotted tasks. My only consolation is that no one was seriously hurt, and our loss is trivial to what might have happened had anyone been killed or badly injured.

I would like to take this opportunity to publicly thank the members of the Contest Committee for their kind words of sympathy for our misfortunes, and especially Mr. Butler, the club's able secretary, who went with me from the club to the scene of the accident at 195th street and personally assisted me to find men and teams to haul away the wreck. I might add in closing that no damage was done, except to the wheels and front axle, and that we started and ran the engine after the truck was righted and found both engine and transmission in perfect order.

It takes time and constant practice to make a chauffeur.

A. H. Chadbourne.

From a Steam Enthusiast.

Editor Horseless Age:

Quite a little has been said on the subject of burnt out boilers. I have owned two steam cars and the first thing I did on receiving them was to take off the small pump the manufacturers put on. They wrote me that this was uncalled for, but after two years' experience I know that it is called for. I put on a size larger than they ever used, and it is now impossible to burn out a boiler, as the pump will feed about twice as much water as is ordinarily needed. I have never been on any hill where the pump would not supply more water than was used. It is so much easier to simply turn the bypass than to work the pump handle, and I never had to do the latter with the large size crosshead pump I use for over 2,500 miles.

My repair bill for the last two months, during which I have driven about 500 miles with a steam dos-a-dos, did not amount to 50 cents, as I take care of the machine myself. I have also run a steam runabout about 1,000 miles, and the repair bill during the entire fall amounted to only $7, although the machine had been run over 3,500 miles before I got it. I find the owners of gasoline and steam cars who complain of large bills do not take care of their machines. I always oil mine in the morning after having taken a ride the day before, clean the engine up, and see that everything is O. K. I go through this procedure even if the machine has not been run 5 miles, and it takes me only about fifteen minutes. In that way I am sure it is in condition when I want to start out with it.

Another thing I wish to call attention to is that I have had any number of people ask me why my machine runs so quietly while the rest sound like threshing machines. A steamer that is handled right is far safer than a horse and much cheaper. For my part, I would never want to own a gasoline car. Good luck to the steamer!

J. H. Wight.

Magnolium.

Editor Horseless Age:

Referring to the article in the issue of May 6 on "A Light and Useful Alloy," why should not "magnolium" replace the brittle hard rubber cell and the quick rotting wooden tray of the automobile battery? It would seem that such a metal would also be useful for carriage bottoms in the electric automobile, and only less so for many other parts. Can you tell us at some later date if "magnolium" is manufactured in this country, and if so, by whom and in what forms? M. H. Bailey.

[Hard rubber is used for storage cells on account of its insulating qualities and not for its light weight. Magnolium being a conductor would be suitable neither for the trays nor the carriage bottoms, as there would be too much danger of leakage of current. The alloy is not manufactured in this country as far as we know.—Ed.]

Location of Gasoline Tank.

Editor Horseless Age:

Viator's points, page 584, May 13, on gasoline tank position are well taken. The constant vibrations to which a motor vehicle is subjected will almost certainly cause tanks to leak sooner or later, and it should be generally known that placing the gasoline tank in or over the motor space is objectionable designing. The average buyer does not think of this matter until trouble arises, when the entire industry suffers. Not only is there danger from fire if a leak occurs, but the heating of the gasoline tends to cause it to vaporize and waste, thus lowering the economy of the vehicle. Chas. E. Duryea.

"Will Gasoline Explode?"

Editor Horseless Age:

Will gasoline explode? This question, I believe, has been answered by various experts, yourselves included, in the negative; yet I enclose an article from an off-color New York paper, which states and reiterates that in the course of the destruction of the De Witt gasoline car yesterday there were explosions—explosions that detonated, that fractured numerous plate glass windows, that were heard a mile away, and that sent sheets of flame in all directions to a considerable radius. This would seem to place the question squarely up to "us," and if we have been deluding ourselves on this important subject it should be the duty of a progressive automobile organ to let the fact be known, and in such exact detail that there can be no possible misconception of the dangers as well as the safety to be looked for in the handling of automobiles. I have been delighted with the repeated assurances of safety, but I do not wish to be lulled into forgetfulness or carelessness by false information on this point, because I fear the awakening may be too abrupt. In other words, we want to know—and must know—exactly what the conditions are under which gasoline will explode, so that these conditions may be avoided.

C. H. Ingersoll.

[For answer see editorial pages.—Ed.]

Control Demonstrations in Paris.

On Tuesday, May 12, a series of demonstrations were given in Paris to convince the municipal councilors that the existing speed limit of 12 kilometres (7½ miles) per hour in Paris and the Bois de Boulogne is an absurdity in view of the exceptional control which drivers have over their machines. The program for impressing the authorities, though somewhat theatrically arranged by the A. C. de France, was unquestionably effective. Practical demonstrations of the brake power of a car running side by side with one of the ordinary cabs were given. A fashionable carriage drawn by spirited horses belonging to Mlle. Balthy, a Parisian music hall actress (who entered into the spirit of the demonstration and offered the use of her carriage for the purpose), was also requisitioned, while gendarmes unexpectedly called upon the cars to stop, and in other cases suddenly darted out and threw dummy figures immediately under the wheels of the oncoming vehicles. In each case of these "surprises" the cars were brought up in time to avoid what would in the ordinary course with other conveyances have been a bad accident. As regards stopping power, the cabs required at least double the distance to draw up in than the cars going at the same speed needed. With spirited horses the distance was 10 yards for the horses against 2 yards for the car. Some thirty or forty cars assisted in the demonstrations, and it is hoped the effect will be so convincing upon the municipal authorities that considerable modification of the present stringent speed regulations will be shortly announced. An unrehearsed "surprise stop," tried by one of the councilors, who threw his umbrella in front of a passing motor car, was hardly appreciated by the councilor personally, although the result created considerable amusement among his fellow passengers. As the unrecognizable umbrella was returned to its owner, he was informed that the car in question was not one of those being used in the demonstration, but an ordinary passing automobile, the occupants of which no doubt wondered vastly at such apparently eccentric behavior on the part of a respectable looking gentleman.

The Paris-Madrid Race.

the end of the first stage of the -Madrid race it appears that this is iat will be run of it. As regards acci- the race, even after the first stage, been the most disastrous of any in nobile history. Following are some e more serious accidents reported to

arcel Renault, who was the winner the first to arrive in the Paris-Vienna last year, had his car overturned into ep ditch alongside the road near ıé, 21 miles from Poitiers, and was dangerously injured. At 4 o'clock p. Sunday a telegram received by the mobile Club of Bordeaux stated that ult was still unconscious and that it feared he was dying.

rraine Barrow met with a very seri- accident near Libourne, 17 miles from eaux, at 1:45 p. m. Mr. Barrow, it ars, was trying to avoid a dog cross- the road, and his car, owing to its ic speed, became unbalanced in its e and struck a tree with tremendous . The chauffeur was instantly killed Mr. Barrow himself was picked up nscious and taken to a hospital, where ondition was declared to be critical.

ar Bonneval, car No. 243 (Wolseley), n by Mr. Porter, was overturned at a oad crossing and caught fire. The ffeur was caught underneath the auto- le and burned to death, and two sol- and a child were also killed.

other accident occurred near An- eme, in which a machine broke down the chauffeur was seriously injured. he neighborhood of Ablis a woman ing the road was run over by one of ompeting cars and killed.

e car of Mr. Stead (Dietrich), after ig run alongside of another for a mile , collided with it and was overturned a ditch near Montbuyon. Mr. Stead buried under the machine, while his feur was projected a distance of 30 and received serious cuts on head and

K. Vanderbilt, Jr., started, but ed out of the race after Rambouillet, 45. A number of other American en- , Foxhall Keene, Tod Sloane and Dannat, did not present themselves e starting line, and after Vander- withdrawal C. Gray-Dinsmore re- ed the only American in the race.

ing to the many fatal accidents, the inations which were to be given at eaux on Sunday night in honor of utomobile race were countermanded. the continuation of the race on h territory was at once forbidden by French Premier, M. Combes, and it reported that the Spanish Govern- had taken similar action and pro- d the race on Spanish territory.

start in the first stage of the race given at Versailles, near Paris, in the hours of Sunday last, May 24. It is ated that 100,000 persons had congregated in the little town to witness the start and great excitement reigned everywhere. At 3:35 a. m. a bomb was exploded as a signal to get ready, and a moment later Charles Jarrott (De Dietrich), who drew No. 1 in the assignment of numbers by lot, and hence was to be the first starter, drove his car into the road across the starting line. At 3:45 another bomb was fired, which was the signal for Jarrott to start, and his machine shot forward at a tremendous pace, amid the shouts of thousands of spectators. The rest of the cars were started at one minute intervals, except that in a few cases there was a short delay, owing to disputes with the timekeepers or for other causes. The starting continued until 6:45.

Telegraphic dispatches from points along the route brought the information to the crowds at the starting point that Louis Renault had taken the lead soon after the

Route of the Paris-Madrid Race.

start, having overtaken Jarrott and De Knyff even before Chartres. Reports from Vendome, Tours and Poitiers stated that Renault was the first to pass through all of these towns, and finally came the report from Bordeaux that he had been the first to arrive there, at 14 minutes and 45 seconds after 12 o'clock. His running time is stated to be 8 hours and 27 minutes, thus beating the former record of 8 hours and 44 minutes between Paris and Bordeaux, held by Henri Fournier. Renault drove a machine of the Renault Brothers' make, which ran in the light vehicle class, weighing 1,430 pounds and rated at 30 horse power.

The best time in this first stage was made by Gabriel, who drove a 70 horse power Mors machine weighing 2,200 pounds. He covered the total distance of 343 miles in 8h. 7m. It is calculated that, after deducting the neutralized sections, his average speed equaled 62 miles an hour. Renault is reported to have traveled at the rate of 88¾ miles an hour at Bourdiniere, between Chartres and Bonneval.

The times of some of the other contestants are as follows: Chas. Jarrott (Dietrich), 8h. 44m.; J. Salleron, 8h. 40m.; Baron de Crawhez, 8h. 53m.; J. B. Warden, 8h. 50m.; and M. Voigt, 8h. 55m. Jarrott arrived second, after Renault, and Gabriel third. The corrected times, after deducting times spent in passing neutralized sections, are as follows: Gabriel, 5h. 30m.; Renault, 5h. 32m.; Salleron, 5h. 46m.; Jarrott, 5h. 51m.; Warden, 5h. 56m.; De Crawhez, 6h. 1m.; Voight, 6h. 2m.; Barras, 6h. 12m.; Bougier, 6h. 16m., and Mouter, 6h. 17m. The number of starters is not given, but only 111 machines arrived at Bordeaux out of 270 or more entries.

In Tuesday morning's newspaper reports the following list of accidents is published:

DEAD.

Pierre Roderiz, Mr. Barrow's machinist.
Nixon, Mr. Porter's machinist.
Normand, M. Tourand's machinist.
Dupuy, soldier, at Angouleme.
Gaillon, cyclist at Angouleme.
Unknown peasant woman, at Ablis.

INJURED.

Mr. Barrow, pelvis and thigh broken; amputation likely.

M. Marcel Renault, injured about body and head.

L. Porter, cut and bruised.

Mr. Stead, overturned; badly injured.

Mr. Stead's machinist, head cut open.

Lesna, champion cyclist, broken kneecap.

Georges Richard, chest crushed, ribs broken.

Henry Jeannot, Mr. Richard's machinist, shoulder fractured.

E. Chard, head cut open.

Tourand, severely bruised.

Gaston Raffet, boy; skull fractured, leg and arm broken.

Marcel Renault's machinist, severely bruised.

Madame Chayscas, both limbs cut off.

This makes six dead, three likely to die and ten seriously injured.

Advices from Chartres give details of the accident to Mr. Porter and Nixon, his companion (both of Belfast). The automobile struck the guard's hut at a railroad crossing near Chartres. Mr. Porter shot forward and his car was overturned. Nixon was thrown underneath the car, which caught fire and exploded. The guard tried to rescue Nixon, but found his body burned to a cinder. Porter remained unconscious two hours, when he recovered sufficiently to return to Paris.

According to the latest reports Mr. Stead is so much improved that he will be able to leave the hospital this week. Mr. Bar-

row is also slightly better. Marcel Renault's condition is less satisfactory.

There was much excitement among the contestants at Bordeaux on Monday. Some declared it to be a matter of honor that the race should be resumed from the Spanish frontier, while others were willing to quit, the latter including MM. Charron, Thellier and Passy. When it was learned that the Spanish Government had forbidden the race all hope of continuing was, of course, given up. The automobilists may cross the frontier, but they will be considered simply as tourists and must travel at reduced speed.

Some miraculous escapes have been reported. M. Terry's machine was burned at Coignieres, but he and his machinist were uninjured. M. Rodolph Darzens and his machinist were thrown out near Bordeaux and were practically unhurt, though the car was destroyed.

Opinion of the public and of the press is in general in approval of the action of the Government in putting a stop to the race, but some of the automobilists were opposed to it. On Monday afternoon a meeting took place at Bordeaux of the local automobile club and of the Automobile Club of France, but it was held behind closed doors, and no statement was given out after adjournment. It is reported that the manufacturers have agreed that, as a road race is impossible, the meeting will be resumed within a closed course.

A number of the leading American and French automobilists expressed horror at the series of accidents, and stated that in their opinion it will end speed races in France and at other places on the Continent.

French statesmen expressed themselves very strongly on the subject of road racing, and Senator Prevost announced his intention to interpellate the Government on the necessity for a stringent regulation of automobile racing. He intends also to introduce a stringent law fixing a maximum speed and forbidding racers to circulate in the streets or on public roads.

One of the questions arising out of the terrible accidents of the Paris-Madrid Race is what effect they will have on the Gordon Bennett Race. The question is discussed by numerous English papers and racing men and the prevailing opinion is that as there will be only twelve competitors on the Irish course, instead of over 200 on the Paris-Bordeaux route, no comparison is possible. The A. C. G. B. I. held a meeting, after which a statement was given out containing the following passage:

"In regard to the latter (the Gordon Bennett Race), 7,000 police officers, assisted by the troops and stewards, will have strict instructions to keep spectators off the roads and away from the corners.

"A source of danger in the Paris-Madrid Race was the character of the road surface. A constant cloud of dust hid the sharp corners and prevented the drivers from seeing the gullies which occasionally cut across the road. In Ireland, however, arrangements have been made to spend nearly $7,500 in removing the gullies and sharp bridges and all corners will be treated to prevent the dust being raised."

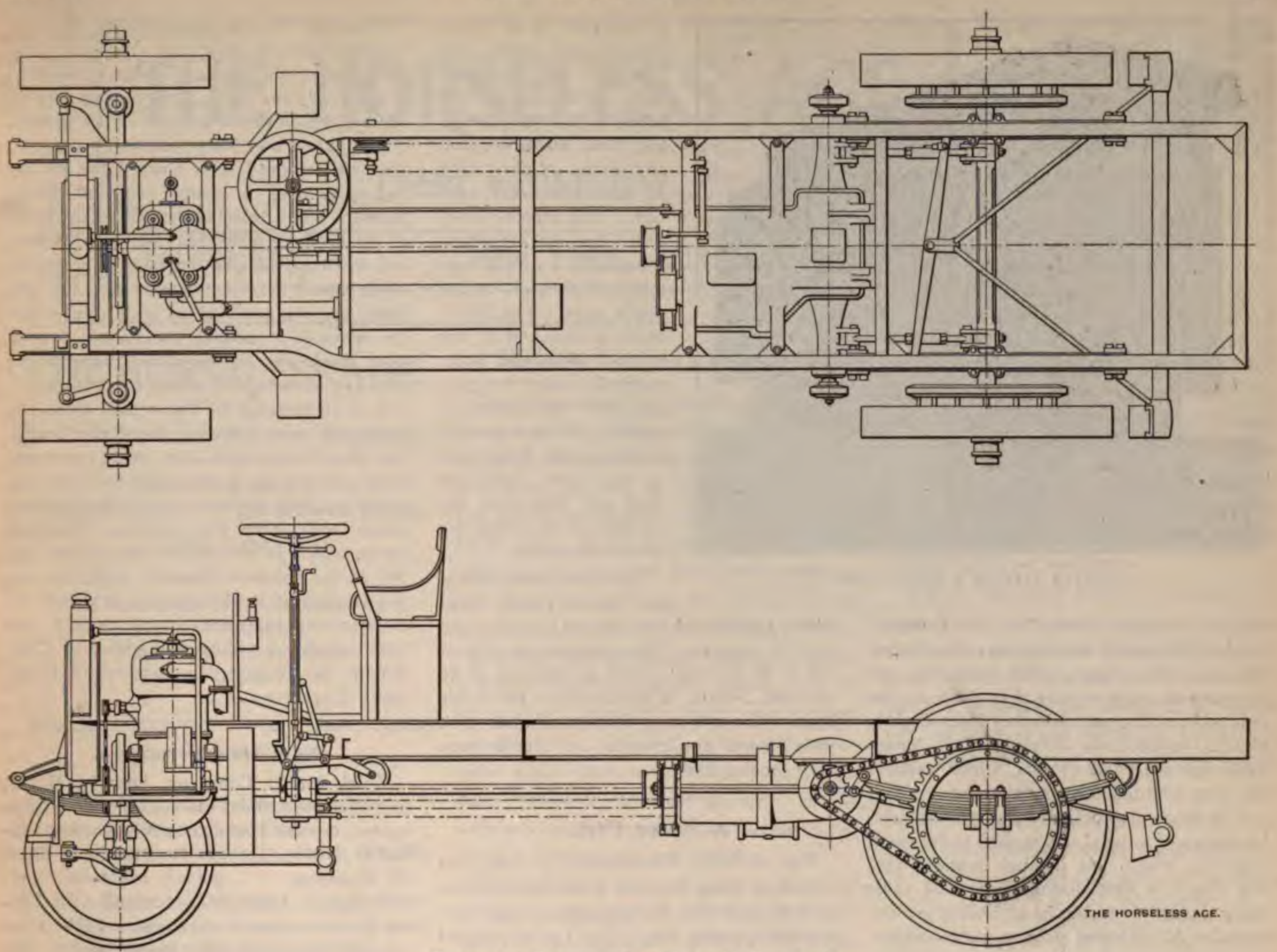
That a race over a comparatively short closed course is much safer from the standpoint of the contestants than one over a long straight course is quite doubtful. In the "Circuit des Ardennes" race last year, which was over a closed course of fine roads, there were more smashups of machines than there had ever been on any single racing day before.

Motor Trucks and Tractors of the Neue Automobil Gesellschaft.

The Neue Automobil Gesellschaft, of Berlin, Germany, builds three sizes of commercial wagons, as follows: Type I, with 6 horse power motor running at 750 revolutions per minute; weight, 1.25 to 1.6 metric tons; load capacity, 1.5 to 2 metric tons. Type II, with 10 horse power motor running at 700 revolutions per minute; weight, 2.25 to 3 tons; load capacity, 3 to 3.5 tons. Type III, with 14 horse power motor running at 650 revolutions per minute; weight, 3.3 to 4 tons; load capacity, 5 to 6 tons. The following information about these wagons is furnished by the manufacturers:

The carrying floor space is as follows for the three types respectively: 90x66 inches, 120x72 inches, and 140x80 inches. The track of the rear wheels is 56, 60 and 63 inches for the three wagons respectively. All the wagons are equipped with two cylinder vertical gasoline motors and have sliding gear transmission giving four forward speeds of 1¼, 3, 5 and 7½ miles per hour respectively, and reverse. All the wagons are sufficiently powerful to ascend 10 per cent. grades with load. The features of the power system include automatic regulation of the charge, automatic water cooling by means of honeycomb radiator and fan, electric ignition

Coal Wagon of the Neue Automobil Gesellschaft.



Plan and Elevation of N. A. G. Chassis.

with current from a magneto; drive by separate chains.

The motors are arranged at the front of the wagons and are readily accessible by simply lifting the bonnet. All working parts are incased. The valve operating shafts are mounted on ball bearings and may be removed from the motor by simply loosening a few screws. The normal speed of the motors ranges between 650 and 750 turns per minute, yet it is possible to reduce the speed to 250 and increase it to 1,000 turns per minute. The motor is lubricated by means of a reservoir feeding oil to the crank chamber, this feed being controlled automatically. The motor parts receive their share of oil by splash in the crank chamber. A device near the bottom of the crank chamber controls the oil level in the latter and a special system of venting prevents oil from being forced out of it.

The ignition is by contact spark, generated by means of a magneto. The time of ignition may be adjusted within wide limits, and the spark electrodes and tripping mechanism are developed in the form of a plug and may be examined as to their proper operation upon loosening a single screw.

The cooling system comprises a surface condenser and a cooling fan driven by the motor. An advantage of fan cooling is said to be that the strong air current through the bonnet keeps all the mechanism thoroughly clean. The total length of piping is only 3½ to 5 feet. The amount of water carried is 1 gallon per 4 horse power of the motor, and needs to be replenished every ten hours of use with about a quart. The cooler is made somewhat on the principle of a fire tube boiler, and can be taken apart for cleaning or repairs. The cooling effect can be regulated in accordance with atmospheric temperature. The water is circulated by means of a centrifugal pump running on ball bearings, which can be dismounted by loosening two screws.

The motors will use as fuel either gasoline or alcohol. When alcohol is used they are started with gasoline, and as soon as the parts have become sufficiently heated the alcohol is turned on. A double carburetor is used in this case, which comprises a vaporizing attachment to insure complete vaporization and to prevent an unpleasant odor from the exhaust.

The fuel tanks are made of a capacity to last for a run of 60 to 90 miles on one charge, and are provided with safety screens over their openings. When alcohol is used a second small reservoir is employed for gasoline, holding from 1½ to 2 gallons. The feed to the carburetor is by gravity. The motors are controlled by throttling the charge.

The power of the motor is transmitted to the change gear by a very flexible, radial clutch, in which all stresses are self contained. The clutch is made of comparatively large dimensions so that the specific pressure on its working surface is small and the wear on the friction lining is small. The change gear gives four forward speeds of 1¼, 3, 5 and 7½ miles per hour respectively, and a reverse speed of 1¼ to 2 miles per hour. The change gear is mounted entirely on ball bearings, which reduces friction to a minimum and prevents hot bearings. The gear is lubricated by means of a quantity of grease placed within the case enclosing it. The change gear is of the sliding gear type and is of such construction that the driver may pass directly from the first speed to the fourth, from the fourth to the second, etc., as may seem expedient. However, the reverse gear can only be engaged after the vehicle has been brought to a stop, which precludes the possibility of damaging the gear by too sudden reversal.

The drive to the rear axle is by separate

CAPTAIN DAYTON'S MOTOR FORT.

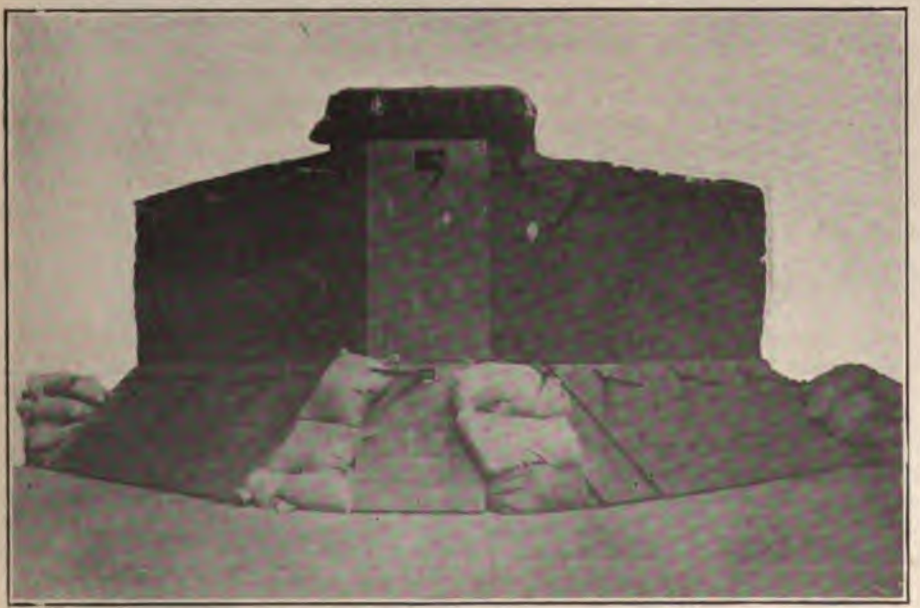
chains, which is claimed by the company to be far superior to chainless or bevel gear driving. The chains, when worn out, can be renewed more readily than gears on the rear axle, and in addition they form slightly elastic connections between the change gear and the road drivers, which reduces the wear and tear on the machine.

The power is applied on all the vehicles by means of a pedal. A second pedal operates the brake, but in such manner that the clutch is first disengaged. The same thing occurs when the hand brakes are operated. All vehicles possess three brakes, one constituted by the motor itself, one foot brake on the change gear and one hand brake on the rear wheel. In ordinary operation the speed of the wagon can be fairly well controlled by simply shutting down the motor, and the machine may be stopped within a short distance by applying a foot brake. The hand brake serves only as an emergency brake. The wagon is steered by a horizontal hand wheel and through an irreversible mechanism. The joints in the mechanism are made dustproof and adjustable. Lubrication is automatic throughout. The motor, however, has an automatic lubricator, a supply pipe from which leads to the crank case. The lubricator is attached to the driver's seat and automatically starts to operate when the motor is started. It has a sight feed and the driver can at any time adjust the feed and determine the amount of oil remaining in the lubricator.

The fuel consumption per horse power hour where gasoline of 0.68 gravity is used is said to be 0.4 kilogram. The consumption of alcohol of 90 per cent., with an addition of 10 per cent. benzol, is 0.6 kilogram per horse hour. The half tone illustrations herewith show some applications of the wagons built by this firm.

A Motor Fort.

The Military Tournament of 1903 has served to bring forward a new idea in connection with the development of field fortifications under fire. The Twenty-second Regiment engineer detachment of New York brought out an armored motor vehicle capable of free action over roads, bridges and fields, providing protection for the firing party concealed behind its armored sides when halted on the line of proposed field works, and being capable of instant extension into the nucleus of the parapet to be constructed there.



THE FORT READY FOR ACTION.

As shown by the engineers at Madison Square Garden, this war machine was started over the pontoon bridge as soon as it was ready for traffic, and, having arrived on the foreign or enemy side of the stream, it was halted and converted into a parapet, with its armored faces toward the enemy and providing a double row of firing points. When crossing the bridge, the front of the machine measured only short 5 feet, but when halted and extended it provided cover about 30 feet in extent. On the flanks the engineers added additional cover by means of a sandbag breastwork carried over inside the vehicle in addition to the men and ammunition which it contained.

It is interesting to know that from the bugle call which started the bridge building detachment into the arena carrying their material up to the time the war machine was fully extended and in action there was a lapse of but nine minutes. The machine, which is intended to keep down the fire of the enemy's riflemen while the engineers are at work crossing a stream or constructing earthworks, was devised and built entirely according to the ideas of Capt. Edwin W. Dayton, Twenty-second Regiment, Engineers.

New Incorporations.

Buick Motor Company, Detroit, Mich., to make automobiles and automobile equipments; capital, $100,000; incorporators, David D. Buick, Thomas D. Buick and Emil D. Moessner.

Arkansas Automobile Company, of Little Rock; capital stock, $10,000; J. W. Lippincott, president and treasurer; C. T. Coffman, vice president, and E. L. Goodbar, secretary.

Videx Automobile Company, of East Orange, N. J., to make, steam, electric and gasoline automobiles; capital stock, $1,000,000; incorporators, Chas. A. Greene, James B. Richardson and Gerald A. Griffin.

Central City Automobile Company, of Syracuse, N. Y., to deal in all kinds of motor vehicles; capital stock, $10,000; directors, Myron C. Blackman, Charles L. Kennedy and Frank L. Wrightman, all of Syracuse.

Charles Kaestner Manufacturing Company, Chicago, Ill., to manufacture automobiles and motor cycles; capital, $50,000; incorporators, Charles Kaestner, Charles D. Cutting and H. Erskine Campbell.

South Broad Street Automobile Company, of Philadelphia, Pa.; capital stock, $5,000; treasurer, Glenn C. Heller, of Philadelphia; directors, Chas. H. Brock, of Wyncote; John W. Brock, Robert C. H. Brock, of Philadelphia, and Horace Brock and John Penn Brock, of Lebanon.

Owing to the large amount of space taken up this week by the report of the Commercial Vehicle Trials, a good deal of matter intended for this issue had to be held over for the next.

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Devoted to Motor Interests

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Rotary Number Plates?

The requirement of carrying a different number for each State is at present probably felt most keenly by automobilists who live on either side of the Hudson River, and are in the habit of crossing over to the other side. Many machines may now be seen on the streets of New York carrying two identification plates, one at each of the lower corners of the rear panel. Sometimes one of these plates bears a number and the other the owner's initials, and in other cases, where the owner has already complied with the Bailey law and registered his vehicle at Albany, both plates bear numbers, and one or both of the numbers are followed by the initials of the State in which they are issued.

The necessity of two number plates is an annoyance, and an enterprising manufacturer has therefore risen to the occasion and brought out a reversible number plate, which carries the numbers of both States, and can be turned around when passing from one State into the other. The idea is a practical one, and will undoubtedly meet with favor among automobilists who frequently cross from one State into another in which local license numbers must be carried. The logical development of this idea, to adapt it to the case of a tourist traveling through many States, would seem to be a rotary number plate on the plan of rotary calendars.

Races and Furious Driving on the Highways.

Gradually the automobile press, particularly of England, is coming to the point where it admits that there is such a thing as reckless driving of automobiles, and that unless something is done to stop it serious injury will result to the movement for more lenient motor legislation. Formerly it was the perversion of the policemen and the unreliability of their cheap Swiss watches which made it sometimes seem that automobilists were going at speeds far above the legal limit, but now we hear about "the inconsiderate few" who monopolize the roads with their racing monsters and are rapidly converting the outside population to what is known as motorphobia. It is at length realized that the question of furious driving is one that demands serious attention.

Yet, at the same time our foreign contemporaries are clamoring for the road race, and particularly the great international events of this kind, of which the ill advised Paris-Madrid horror is an example. If there is any particular cause tending, without doubt, to encourage furious driving on the road it is these very road races. In the large works which enter these contests the engineering departments for a great part of the year are employed on machines producing higher speed, which are specially built for these events. After the race the manufacturers make efforts to sell their contest machines as well as others constructed after the same design to private individuals who are possessed with the speed craze. When one considers how much capital manufacturers invest in these special designs and in the building of the machines, the desire to recoup by selling them appears natural enough. But how can an automobilist who buys a machine capable of a speed of 50 to 60 miles an hour be expected to remain within the legal limit of 15 or 20 miles an hour? High powered machines of this class are entirely unsuited to ordinary road work at legal speeds, and as a matter of fact their purchasers in the majority of cases do not intend them for any such work—they wish to taste the forbidden fruit of speed.

Hence road racing is the direct cause of speed excesses on the highway, and the two may be considered as co-existent. If popular interest in road races should fail they would pass out of existence from natural causes without the intervention of the authorities, and it is extremely likely

that speed excesses on the highway would also cease, as has been true of the bicycle, for it is the glamor of popular interest in high speed that makes it so seductive. It is quite possible that the time is not far distant when automobile organizations may find it necessary to suppress road racing altogether, owing to the encouragement it gives to the speed mania.

More Stringent Legislation Likely to Result.

The excitement created by the many serious and fatal accidents during the first stage of the Paris-Madrid race will probably result in a revision of the French automobile regulations. On May 29 Senator Prevost interpellated the Government on the speed at which automobiles are being driven, and proposed that a distinction should be made between ordinary machines and racing cars. Premier Combes' reply was that automobiles were habitually being driven beyond the legal speed limit, and he promised to appoint a committee to investigate the subject and report upon regulations necessary to control automobile traffic.

It will be of considerable interest to the world at large to note what means the French Government will devise to check this excessive speeding. The present law, limiting speed to 18 and 12.5 miles per hour in country and city, respectively, seems sufficiently restrictive. The trouble is that it is not being observed, in spite of numerous arrests and fines, and the only probable outcome appears to be an increase in the penalties for violations of the law.

Cost of Operation.

No question connected with the use of motor cars is so open to disagreement as cost of operation. In the first place, the purchase price of automobiles varies enormously, while on the other hand there is a great difference in the conditions of operation with different owners. Some drive their machines themselves, keep them at their own premises and make their own repairs, and these naturally have only a very small expense account—nothing, in fact, but cost of gasoline, lubricating oil and waste, with an occasional spare part or addition. Others, however, employ chauffeurs to drive their machines, store them at stations and have all repairs made by the hour. An owner of this last class is likely to run up a good monthly bill, particularly if he has a high powered car and is fond of fast driving.

The question of the cost of owning a motor car has recently been the subject of discussion in England. Henry Norman, M. P., who can hardly be accused of being a pessimist, has figured out that a machine can be kept for $210 per annum, a machine described as a "graceful, good looking vehicle of 5 or 6 horse power, costing $1,000 and climbing any reasonable hill." This machine, too, is to be kept running 100 miles day in and day out, something which has hardly yet been accomplished with any automobile, even of much higher power than that here specified, for any length of time.

We will not deny that it is possible to keep an automobile for the sum stated per annum, but the expense will certainly be larger unless the owner keeps the machine at his own stable, cares for it and makes minor repairs himself. Even then economy must be practiced in every way, and the owner must be favored by unusual good luck, if this figure is not to be exceeded with a vehicle in use all the year around. Naturally, the estimates of Mr. Norman are not accepted by all automobilists, and Kennedy Jones, writing in the *New Liberal Review*, takes the opposite view and endeavors to show that automobiles are not nearly as economical as Mr. Norman would have one believe. "Seven or 8 horse power cars there are—let the reader remember that the term 'horse power' is loosely applied in its relation to motor cars—made by firms of world wide repute which can be driven anywhere and over everything at an average speed of 16 to 18 miles an hour; but these cost from £400 to £550, and the expense of running is proportionately as great as that of a larger car, and could not, under present conditions, by any stretch of economy or ingenuity be brought within £42 a year."

Mr. Jones relates his experience with a 10 horse power car, costing $4,200 before it was fully equipped, which he ran 12,000 miles in eight months. An itemized account is given of the expenses during this period, including chauffeurs' wages and help for cleaning, which shows that $1,180 was paid out in all. At the end of the eight months a further sum of $325 was spent for overhauling, rebrassing, etc., making a total of $1,505 for the 12,000 miles, not allowing for depreciation. This was a four seated car.

Mr. Jones' aim is, evidently, to make the automobile appear as a very expensive conveyance. Ten horse power cars selling for over $4,000 are practically unknown in this country, barring imported cars, the price of which is considerably raised by the tariff duty, and must be rather rare also in Europe. Yet as his cost figures out to only 12½ cents per mile or about 3 cents per passenger mile, it does not prove the machine so expensive in operation after all.

Further Ferry Accommodations.

For two years after the passage of the Platt law, permitting ferry companies to carry automobiles using gasoline at option, the Hoboken Ferry Company, operating lines between Barclay street, Christopher street and Fourteenth street, Manhattan, and points in Hoboken, refused to exercise this right and barred all gasoline using automobiles from its boats. Recently these lines passed into the possession of the Lackawanna Railroad Company, and one of the first acts of the new management was to rescind this rule of the former owners. The announcement will come as welcome news to large numbers of automobilists in Manhattan, as the Fourteenth street ferry leads almost directly to the Hudson County boulevard, one of the finest stretches of paved road in the vicinity of New York. It is also of interest as indicating that the prejudice against automobiles as dangerous machines is on the wane.

Calendar of Automobile Dates and Events.

June 18—20.—Paris Automobile Fetes.
June 18—28.—Aix-les-Bains Auto Events.
June 20—21.—Circuit des Ardennes.
July 1—15.—Irish Fortnight.
July 2.—Gordon Bennett Cup Race.
July 12—19—Ostend Automobile Week.
July 24—Quarterly 100 Miles Trial of A. C. G. B. I.
August 10—22—Tourist Motor Bicycle Reliability Trials.

A report was current in Paris a fortnight ago that the well known automobile business of Messrs. Panhard & Levassor had been sold to an English syndicate, which is to form a company of £2,500,000 sterling. The principal partners in the business are M. Panhard, M. Clement and Madame Levassor, widow of M. Panhard's late partner. The owners of the business are to receive $5,000,000 in cash and $5,000,000 in shares, while the promoters are to receive $2,500,000 cash and shares for guaranteeing the necessary capital and paying the expenses of the promotion.

LESSONS OF THE ROAD

Diary Notes of a User.

By —— ——.

While most automobilists, unless unusually enthusiastic, await the coming of spring before seeking road experiences, the writer thought that he would try a little winter driving. The cooling water was all drawn off before the unusually severe spell of weather and the tanks were filled with calcium chloride solution. Some three-quarter inch rope was procured and the rear wheels closely wound with it. With about 8 inches of light snow on the ground it was decided to make an experiment in winter running. The engine was started up after a little difficulty, and we started out through the drifts with the temperature 10° above zero; and right here let me say that personally there is no pleasure involved in any form of outdoor winter diversion that does not involve hard muscular exercise. Sleighing is entirely without attractions, to the writer at least, owing to the terrific jolting due to a vehicle absolutely rigid and without springs as it passes over the crossings and broken hummocks of the road and falls without the slightest resilience, except that which nature has provided in the rider. It may be possible to protect one with robes in a sleigh better than in an automobile, but the swift motion that is the particular beauty of automobiling will probably induce a condition so cold that very few people will seek self propelled vehicles in the winter from a pleasure standpoint.

After a very few minutes of operation we found the engine losing power, and finally it began to pre-ignite so badly and became so hot that it was necessary to stop every few blocks to allow it to cool down. The stable was fortunately reached after a time, and an inspection of the vehicle was made. The difficulty was soon located. Although means had been provided to draw off the water completely by means of a plug in the bottom of the engine jacket and another in the bottom of the radiators, there were certain points at which the rubber circulating pipes sagged to a level lower than either of these plugs. During the cold spell, water had frozen in these bends, and had not thawed out when the calcium chloride solution was put in, and thus the circulation was entirely suspended. When these bends were thawed out by means of hot water, the vehicle operated perfectly, but the heating which the engine had sustained had broken down the cylinder head gasket, which was of wire woven asbestos, and it had to be completely packed anew.

No trouble was experienced in guiding the vehicle and in securing the necessary traction, as the ropes overcame the difficulty perfectly, but it soon became apparent after a few miles of running that the maintenance of ropes on the tires of a vehicle weighing a ton was too expensive to be practical, as the rope was flattened upon the tread very rapidly and almost cut off in certain places where car tracks or sharp paving stones had been encountered. Something more durable than ordinary manila rope must be found with which to wind the tires of heavy vehicles in order to make winter running practical from this standpoint, and certainly manufacturers ought to arrange their circulating pipes so that all the liquid would siphon out of them through the draw-off plugs.

ADDING A TONNEAU AND REDUCING THE GEAR.

The vehicle in question is a single seater with hood and provided with a trunk platform of very ample size in the rear of the seat, and it was determined to convert it into a vehicle of the tonneau type, capable of carrying four or five persons, and a removable tonneau was constructed by a local carriage builder. In order to handle the added weight, it was decided that the car must be geared down, and it was also thought that the gearing down would make a much more satisfactory vehicle for two persons, considering the bad roads of the vicinity and probable speed legislation. The sprocket ratio was accordingly changed from nine teeth on the engine shaft and twenty-seven on the rear axle to nine on the engine shaft and thirty-two teeth on the rear axle. The manufacturers of the car discouraged making this change, and it will probably be found that manufacturers will be averse to seeing their vehicles geared down, however much they may need it, owing to the aspersion which is thus cast upon the power of their engines. The result of this change has been most eminently satisfactory, however. The roads which this vehicle has to travel are sandy and hilly, and previous to the change the high gear could not be used nearly all the time, and troublesome changes to the intermediate and low speeds had to be made when running over the country roads in order to mount the grades or to prevent the engine from laboring unduly. With the present gear, almost all roads can be taken on the high speed by the use of the throttle and spark alone, and by a very occasional use of the intermediate speed all ordinary road conditions can be handled. The low gear is now so low that it would probably slip the wheels before stalling the engine, and it is now possible to start the vehicle from rest on the high speed where the conditions are at all favorable, and to start under all conditions on the intermediate. It is believed that a great many users of automobiles, in this day of speed regulation, and now that comfort is beginning to become a more important consideration than high speed, would be benefited by the gearing down of their vehicles, by which they would be rendered almost as easy of operation and as obedient to the throttle as the steam vehicles, which are held out to us as models in this respect.

CONTACT DEVICE IMPROVED.

The contact device on the engine here referred to was provided with contacts of the telegraph key pattern tipped with hardened platinum points. The arms which carried the contacts were not steel springs fixed at one end, as found in the usual trembler type, but were brass arms pivoted on small studs at their fixed extremities and operated by a fibre cam of the proper form. The engine would miss a good many explosions at times, and when searching for the trouble one evening with the engine running in the dark, sparks were noticed between the pivoted contact arms and the studs which carried them, and the seat of the difficulty thus determined. The brass arms had worn on their studs to such an extent as to break contact with them at times. The difficulty was temporarily corrected by applying a small brush of stiff spring metal riveted to the contact arm and making a rubbing contact on the stud, but shortly after a form of contact device was adopted of the commutator and brush type, having rubbing contacts only, and doing away with all platinum points and hammer breaks.

SHORT CIRCUIT RUNS DOWN BATTERY.

After a visit to the carriage shop one day for some small repairs, it was found that the batteries were entirely exhausted, and this was rather a surprise, since they had only been installed a very few days. Upon taking up the seat board which covered them a piece of metal was found lying on top of the two sets of batteries and short circuiting their terminals. This piece of metal had been removed from the vehicle by one of the carriage shop people, and for convenience's sake it had been tucked into this place with perfect innocence on the part of that electrically unsophisticated individual.

RUBBER PACKING CHOKES PUMP INTAKE.

One pleasant evening we started out for a nice ride, which was thoroughly enjoyed for four or five miles, when the engine began to pound badly and was greatly reduced in power. Fortunately, however, it held out all right until the stable was reached, but it certainly was the hottest motor that ever came under the writer's notice. Griddle cakes could have been fried with rapidity on the crank case cover, and the whole thing was absolutely hissing hot. There was nothing to lay the trouble to except faulty circulation, as the tank was full and, more significant than that, was cold. The pump was turning with its usual rapidity and there seemed no cause for trouble. One by one the circulating connections were taken apart and found to be perfectly free, although high pressure steam was coming out from the jacket. Everything else being in good condition, the pump fell under deserved suspicion and was finally dissected, when the inlet orifice was found to be completely plugged up with rubber packing. The pump was of

the centrifugal type, and its sides screwed together with a packing between them. Ordinary rubber had been used, and in the act of screwing it up this had become torn, and after deteriorating by use had broken up and its remains had entirely choked the pump intake. It was repacked with a proper packing, and the engine runs as cool as ever.

A LEAKY FLOAT.

In starting out one day for a drive the action of the engine was very irregular and the power very low. At last it was noticed the gasoline was constantly dripping from the carburetor overflow, and after a few more miles of running the stable was sought, where an investigation was held. The carburetor was taken apart and the float removed, when it was found to be about half full of gasoline, adding sufficient weight to it so that it did not rise and close its needle valve, but allowed gasoline to come into the float chamber all the time, thus flooding the carburetor continuously. The leak which existed in the float was quite hard to find, on account of its very small size. The only way in which it was located was to heat the float considerably and then search for the hole with a match. At last the place was found from which gasoline was issuing, and it was carefully marked. A hole was punched in the top of the float, the gasoline shaken out and a careful job of soldering done on the defective part, and the hole which had been punched carefully soldered up, thus closing one more chapter in "the diary of a user."

A STEERING GEAR ACCIDENT.

On a beautiful April morning we started for a city about thirty miles distant and enjoyed a most delightful drive, taking the road in a leisurely way and stopping at several points for lunches or to enjoy the scenery, but not once for any trouble with the machine. Starting home in good time we had covered a good portion of the distance, and were jogging along uneventfully when suddenly the car turned nearly at right angles and made a wild rush for a hay field at the side. With the instinct that comes of long practice, the wheel was whirled in the opposite direction, but without result, and the vehicle turned completely around and headed in the opposite direction before coming to a stop. Fortunately, the speed was not sufficient to cause it to capsize.

The steering gear had given way and a moment's investigation showed the loss of a pin which normally secured the rod which connects the steering sector with the steering knuckle. Walking back along the road for a short distance we were fortunate enough to find this pin, and it was at once put into place, and by use of a small cold chisel which we happened to have and the monkey wrench as a hammer, the ends of the pin were upset sufficiently to hold them. The front axle and steering pivots, although badly bent, were still capable of running, and we started along after a delay of fifteen minutes or so, thanking Providence most devoutly for a fortunate escape from what might have been a fatal accident.

The pin in question was not headed perceptibly on either side, and was not held in any manner except by the closeness of its fit in the crotch of the rod which it actuated. There is in the same steering gear another example of this form of malconstruction, and these two pins have been replaced by a bolt of driving fit for the crotch, having a liberal head on one side and a hole drilled through it on the other side, in which a large size cotter pin is driven. It is perfectly inconceivable how manufacturers will disregard the most common and elementary precautions in the building of their vehicles.

One interesting thing in connection with steering gear accidents is that one seldom does the right thing. When a machine swerves it is inevitable that one should try to correct it by the steering wheel, as one is trained to correct every swerving of the machine. Of course, this is never effective, and it would be far better if the engine were thrown out and all brakes applied, but it is very seldom that one has the intelligence to do this. If the car appeared to be in danger of colliding with anything the operator would instinctively throw out the engine and apply all brakes, but in a steering gear accident he will always try to save himself with the steering wheel and neglect the more useful acts. In this instance the engine was not thrown out at all, nor the brakes applied, and the engine stalled itself, and I believe that nine out of ten good operators would have been caught in the same manner. Steering gear accidents are the only thing about an automobile, save perhaps brake failures, that need frighten any user. Let everyone inspect his steering gear with the utmost care for possible points of weakness.

Trade Literature Received.

H. H. Franklin Manufacturing Company, Syracuse, N. Y.—Catalogue I of the Franklin Motor Car.

Brennan Motor Company, Syracuse, N. Y.—New catalogue of Brennan standard gasoline motors.

Automobile Lock Company, 560 West Jackson Boulevard, Chicago.—Circular describing a safety lock for Oldsmobiles.

Badger Brass Manufacturing Company, Kenosha, Wis.—Colored poster of "Solar" automobile lamps.

Oakes & Morse Company, 40 Sudbury street, Boston, Mass.—Circular of the Comet Spark Plug.

The Hoffman Automobile and Manufacturing Company, Cleveland, Ohio.—Catalogue of Hoffman gasoline cars.

Columbus Motor Trucks and Wagons.—The Motor Truck and Vehicle Company, Columbus, Ohio.

French Volt and Ampere Pocket Meters.—Oelschlager Brothers, 42 East Twenty-third street, New York city.

Maintenance and Repairs.

V.—The Grinding of Valves.

By W. O. Anthony.

The throttles upon all steam machines generally require regrinding at regular intervals, and a few words as to the proper method of performing this apparently simple operation may not be out of place. The writer has been in repair shops and seen supposedly competent men grinding poppet valves, whether for steam throttle or for gasoline inlet or exhaust, holding one part in a chuck in the lathe and the other part in the hand, and running the lathe at a rapid rate, feeding the grinding material around the joint to be ground and bringing pressure upon the parts by the hand. This is decidedly the wrong way to accomplish the desired end, viz., a perfectly straight, true surface at the valve seat entirely free from rings.

These rings or grooves once started upon the seat and valve surface of any form of poppet valve, it is almost impossible to efface them by subsequent grinding, no matter however carefully done, and the only remedy would consist in machining the surfaces down to true again, putting the valve into the lathe and turning up a new surface and using a special angular milling cutter or reamer for the seat. If a due amount of care is exercised in the grinding these expedients will never become necessary, and in grinding such valves the surfaces should be smeared with machine oil and emery, using about No. 90 to begin with for most work and finishing with flour of emery.

In the case of a steam throttle one piece should be held in a vise and the other part turned by the fingers or a screwdriver, with the application of only moderate pressure, as too heavy pressure will be apt to produce the grooves above referred to. The parts should be turned first in one direction, then in the other, turning in one direction a little farther than in the other each time, so that the valve is continually revolving over all portions of the seat. As soon as the grinding material has ceased to cut—which can be felt and heard—the old material should be wiped off and replaced by fresh. In the case of a steam throttle, where both surfaces are of brass, it is a good plan to finish with grindstone grit. The ground surfaces should not be shiny when finished, but should have a dull, frosty appearance, and both valve and seat should show a uniform character of surface all the way round.

Kerosene Burners, Steam Engine Oilers and Dashboard Odometers.—National Oil Heating Company, of Melrose, Mass.

Casner Friction Clutch Pulley.—The Casner Pulley Company, of Auburn, Ind.

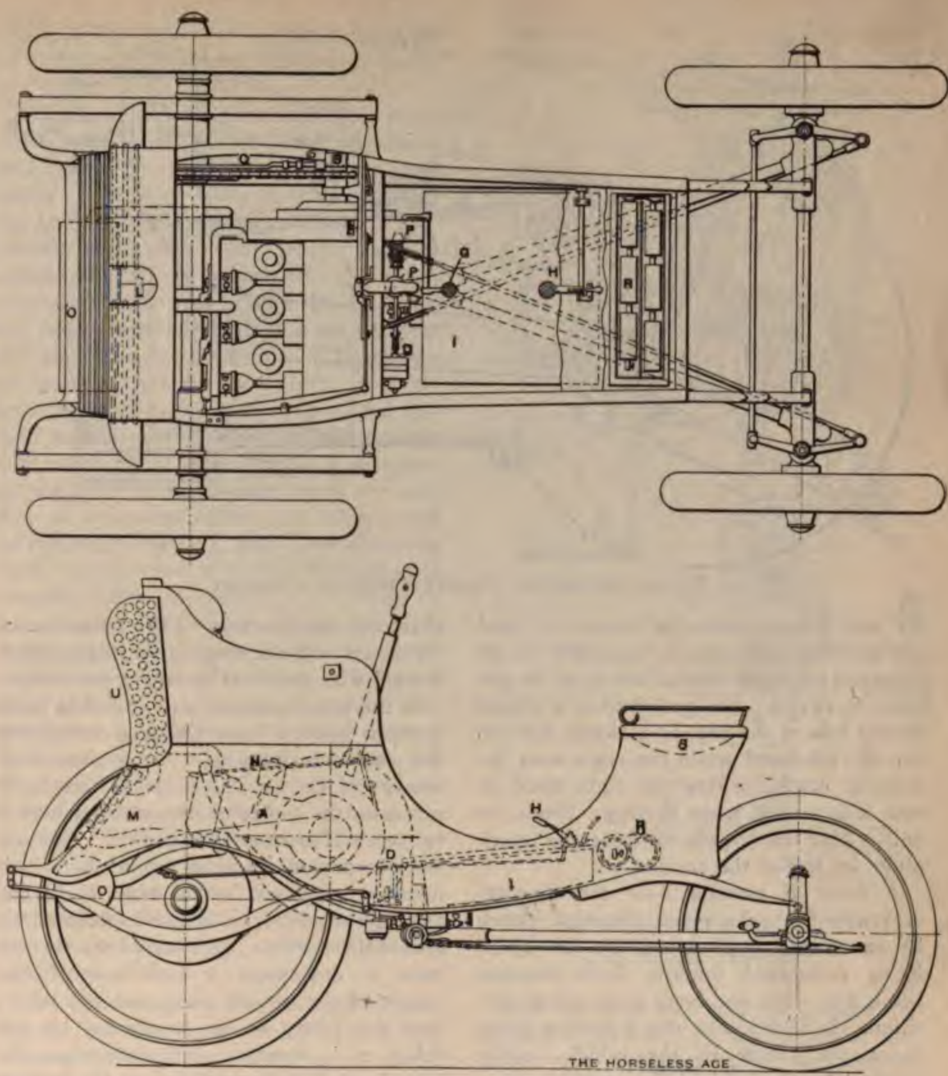
The Duryea Cars.

: Duryea system comprises primarily
ɔle cylinder motor, with a two speed
everse planetary transmission gear on
notor shaft, connected by a short
to a large sprocket on a live rear
The plan and elevation shows the
r, with cylinders inclined, placed
the operator's seat at the right hand
of the vehicle, while the driving chain
s sprockets are on the left side of the
le inside the bearings on which the
gs rest. The inclination of the motor
s the oil to flow back into the crank
from the cylinders, and thus prevents
ing, while the location of the inlet
s, the throttle slide, the spark plugs,
ust valve, sparker mechanism, cam
and oilers on the top side of the en-
brings these parts into the most ac-
ɔle position possible.

e crank case is of sheet metal, instant-
moved by detaching a hook, permit-
ready access to the cam shaft, crank
and all bearings, including the spark-
echanism. The pistons withdraw from
ylinders more than an inch, so that
condition can be ascertained at a
e, which is the safest and surest way
owing whether or not they are being
erly lubricated. The vehicle is so low
he parts so easily reached by remov-
he cushions and front panels that the
man stands in a comfortable position
inspecting or working upon any
.

e motor A is supported upon the sills
e body by an angle iron framework,
the shaft extension which carries the
mission gear is provided with a bear-
3 at its end on the left body sill. Re-
ng this bearing by withdrawing two
permits the sprocket to be removed
nterchanging, or permits the entire
mission gear to be taken out in less
fifteen minutes. This end of the
shaft is screwed into place and read-
nscrewed by a special wrench. A dis-
rod C from the end bearing to the
axle takes the pull of the chain in a
manner and provides a simple means
justment.

e magneto D is placed slightly below
n front of the crank case with a long
having a flexible joint near the mag-
and a pulley E, with governor ar-
ed to engage the face of the flywheel.
pulley is of such size that the mag-
turns fast enough to ignite when the
r is pushed over a compression
ly, and the governor prevents excess-
peeds doing damage to the magneto.
the magneto one wire is grounded
e framing, while the other is carried
r to the coil or to the switch if bat-
are provided. The switch is a three-
affair, to which one wire from the
neto and one from the battery are at-
d, while the third wire goes to the
A spring keeps the switch constantly
ne magneto except when the button
shed to connect the battery instead.



Figs. 1 and 2.—Plan and Elevation of Duryea Car.

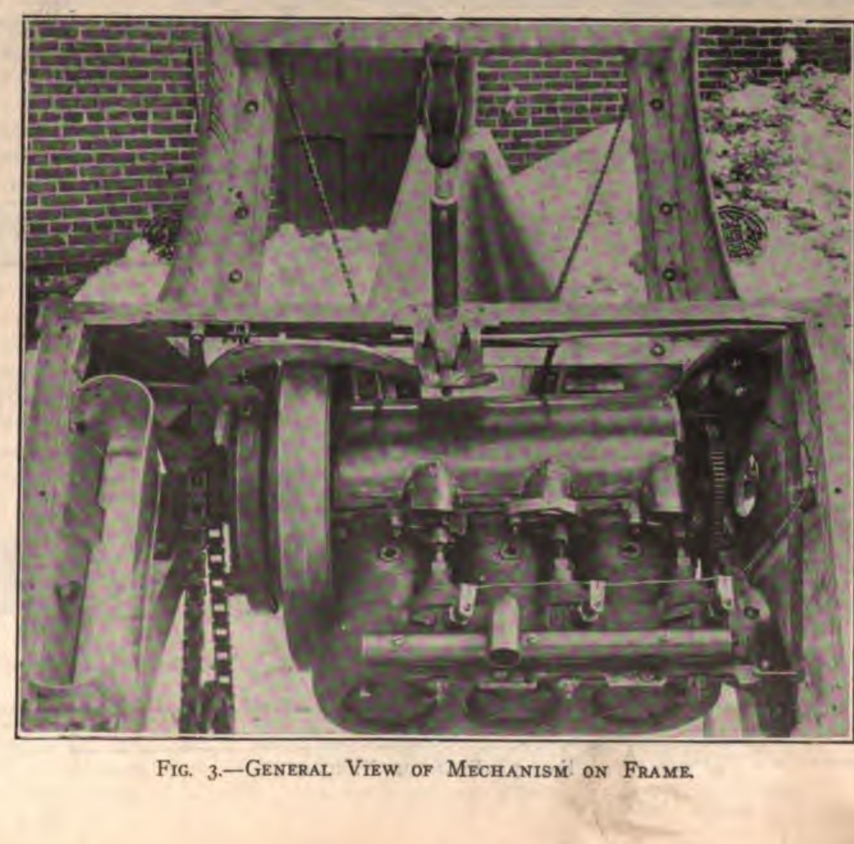


Fig. 3.—General View of Mechanism on Frame.

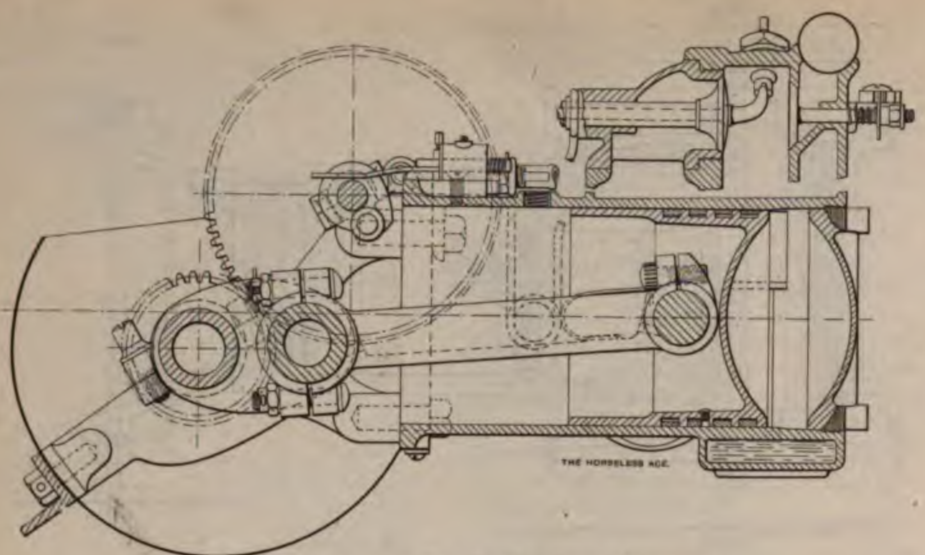


FIG. 4.—SECTION OF ENGINE THROUGH CYLINDER.

By this arrangement the battery is used for starting only, and is not liable to be damaged by unintentional use or by forgetting the switch. The push button is placed on the side of the seat in a handy position for the left hand while the right uses the starting crank, or for the right hand in case it is needed when driving. From the coil a bare wire leads to the three spark plugs on top of the engine.

A lever F passing over the flywheel crosswise the vehicle sets the high clutch by an upward motion and the low speed by a downward motion, both clutches being free when the lever is in middle position. In addition to this a reverse pedal G at the centre of the vehicle, easily reached by the heel of the operator from either side, gives a reverse motion by changing the direction of the operation of the gears and the regular or high clutch is used with this heel pedal for reversing.

In the large sprocket an expanding band brake is located from which a connecting rod passes forward to a lever projecting below the floor. The pivot of this lever passes to the centre of the vehicle where a toe lever H is mounted upon it. This toe lever is provided with a ratchet by which it may be locked when desired. Being centrally placed, it is accessible from either side of the vehicle. Both it and the reverse have a downward motion toward the centre of the vehicle floor, and are therefore not likely to be obstructed by lap robes, as is sometimes the case when the lever is pushed forward toward the box or dash.

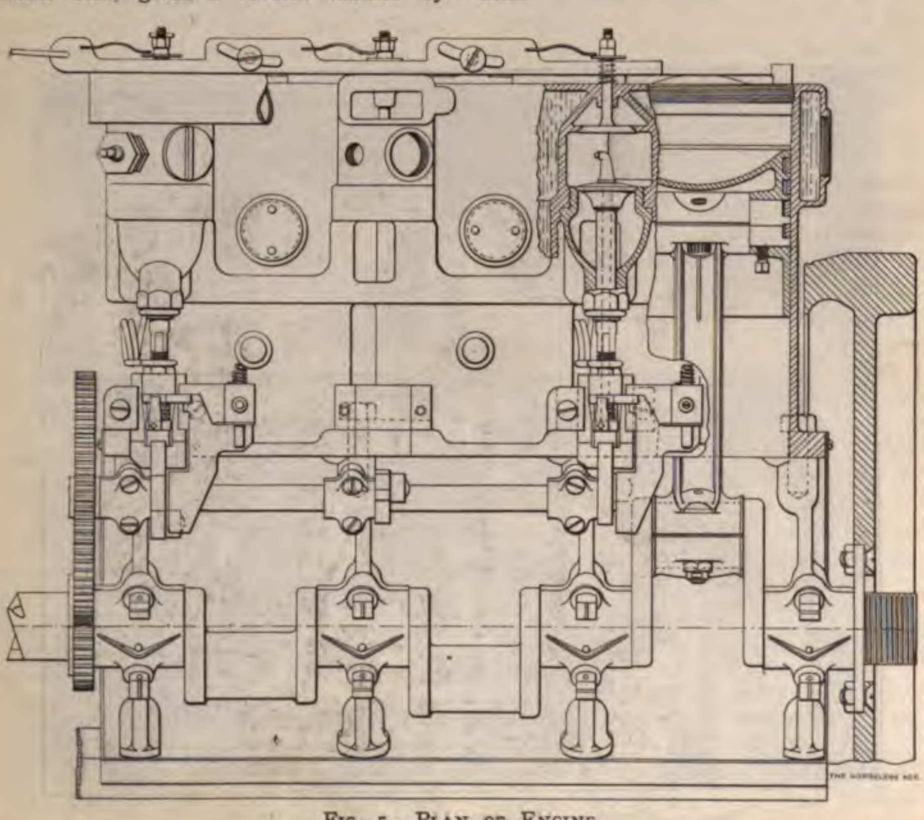


FIG. 5.—PLAN OF ENGINE.

Under the floor hangs the gasoline tank I in front of and below the motor and mechanism. It is therefore in the coolest and safest place, where any leak is sure to fall free of the motor, muffler or other heated parts. At the rear of the tank is a well, provided with a pet cock J, permitting either gasoline or water to be drawn off—a valuable precaution when one gets water with gasoline. To this well the mixer is attached, and from the space behind the gasoline tank pure air is drawn past the mixer to operate the motor.

The water tank U is carried at the back of the seat. It has 150 air tubes into which a current of air from each side is deflected by wings; the heated air passing out at a central opening L. The water passes to a tubular panel M, closing the rear of the vehicle, thence forward to the bottom of the water jacket, thence upward and back to the tank by the expansive effect of the heat.

Three oil cups N of large capacity and with large filling opening are provided on top of the cylinders, the only oil cups except on the magneto and wheels. These cups are of special design and feed by gravity when the engine is running. At the extreme rear of the vehicle with openings slightly below horizontal is a cylindrical muffler O which receives the exhaust gases from all three cylinders. Mounted on this is a superheating chamber to receive any escaping steam from a vent pipe passing downward through the water tank, which chamber, by both heating the steam and mixing it with the exhaust gases, effectually dispels it.

Long, semi-elliptic springs (38 to 45 inches) support the rear of the vehicle and allow an amplitude of 5 to 7 inches—an unusual spring movement for so light a vehicle with corresponding comfort. The forward end of the vehicle is supported on quarter elliptic springs shackled at their front ends to the axle which forms part of a triangular front running gear. The rear end of this triangular gear is supported in a ball and socket joint P under the centre of the vehicle, making a most easy and flexible arrangement.

The steering heads are provided with two arms each, the two rear ones being connected by a cross rod, while to the front levers the tension steering connections are attached. These consist of light rods with bicycle chains to pass around rollers and up to the arms of the steering lever. This device is a distinctive feature on Duryea vehicles, and will be described more fully later.

In front of the fuel tank is a battery case R, consisting of a tin box lined with insulating material in which six dry cells are placed with the carbon of one contacting against the bottom of the next, thus doing away with wires and binding screws. The zinc of the first cell is grounded on the case. A metal spring at the bottom of the case connects the third and fourth cells, while the live wire from

ttery is attached to the carbon of the cell.

ess otherwise ordered Duryea vehi-re built with narrow tread in front, is claimed to lessen skidding, in-bility to get out of wet car tracks ermit turning in narrower streets, exceeded in these respects only by ree wheeled form. An ample parcels front provides carrying space, while ockets on the lid bring these nec-articles in a most convenient posi-when the lid is opened backward. entre of gravity is kept well to the experiments having determined that, nerally arranged, skidding is about y frequent with the front and rear s, which is believed to be the best possible to obtain. Thirty-six inch heels with 30 inch fronts and 3 inch re standard, although other sizes are imes furnished. The large sprockets pond with the large wheels and les-e strain on the driving chain. Am-ooden mudguards are used, and the ons have tops regularly.

THE MOTOR.

plan and elevation of the motor most of the salient features. The cylinders, 4½x4½, are formed in a casting, with exhaust passages down en the cylinder walls. The exhaust seats B are elbow shaped, screwed position and by suitable gaskets d to discharge downward through assages provided.

exhaust valves A (Fig. 6), having fillets, are of cast iron, with conical screwed and riveted to the steel D. These stems are hollow, to pro-a bearing for the sparker stems T, oscillate therein. The exhaust valve are provided with threaded ends ock nuts to attach them to the ex-slides E, which are provided with s F contacting on the exhaust cams he light weight of the valve, its long ng in the valve seat casting and its nce by the exhaust slide insure accu-alignment and freedom from leakage o wearing, thus overcoming the dis-tage of horizontal position in the r of durability, while securing the est accessibility. The exhaust valve g H is of the sheep shear pattern, ed into place and readily unhooked it is wished to remove the exhaust . This valve is readily removed by g out the two screws holding the caps e slide and unscrewing the seat, after h the valve or sparker may be ground lace without changing their adjust-s.

the sparker stem is journaled a ham-I, a coil spring and a clamp J fixed in ion by a set screw. On one of the caps is pivoted a lift M, which trips hammer I, the lift in turn being op-d by a roller N at the side of the ex-t cam. When the lift reaches the er height the hammer drops off, strik-he clamp a quick blow, which knocks d the sparker stem away from the in-sulated plug O (inserted through the walls of the firing chamber), making a quick, hot spark.

The inlet valves U bear on seats formed in the cylinder walls, and being very light, with limited motion, are said to give practically no trouble. They have ample guiding and supporting surface, which, in connection with their light weight, insures against excessive wearing. The spring adjusting nut and lock washer on the outer end of the inlet valve balance the head on the inner end, thus relieving the valve from the tendency to drop out of line. A single feed pipe passes across the top of the cylinder admitting the mixed change to each inlet valve. The throttle slide V mounted on the head of the engine limits the motion of the inlet valves, the slide being movable endwise in a path determined by slots, which cause it to vary the possible motion of the inlet valves. If moved to one extreme the valves are held from opening and the engine stops. If moved to the other the inlet valves are forced open and the compression relieved. This forcing is accomplished by light springs W Z, and in case of an explosion the rush of gases against the valve closes it, the spring not being stiff enough to resist the pressure. This closure permits the explosion to exert its force against the piston instead of rushing back through the supply tube and deteriorating the next charge. This device materially assists in starting so large a motor.

The cam shaft may be removed by taking out six cap screws which are on top in accessible positions, likewise the crank shaft may be removed by taking out eight cap screws equally accessible, and wired in position to prevent loosening in service. All bearings are large, the crank shaft being 1⅝ inches in diameter, with pin and crank bearing 2¼ inches long. These cranks are ordinarily hollow for increased stiffness and lightness, and are frequently packed with candle wick which absorbs oil, yielding same through holes in the shaft when hot. The bearings and connecting rods are of bronze and the connecting rod bearings are readily adjustable by means of nuts fastened by cotter pins at the crank pin end; and by milled slots in the head of the clamp screw engaged by a spring at the wrist pin end. The wrist pins are 1⅜ inches diameter by 2½ inches long.

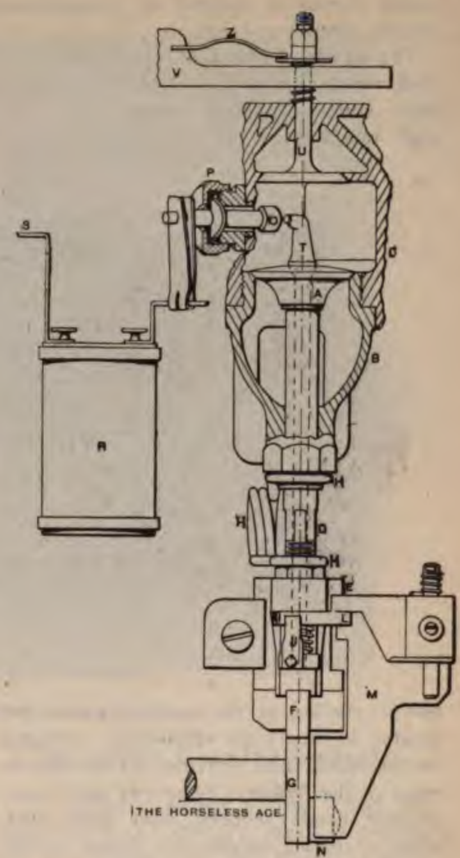


FIG. 6.—SECTION THROUGH EXHAUST VALVE AND IGNITER.

Both pistons and cylinder heads are cupped to prevent springing under the force of the explosion, and to increase the combustion chamber capacity in proportion to the wall. Four eccentric rings are fitted to each piston. The cylinder heads screw in with ground taper joint inside the

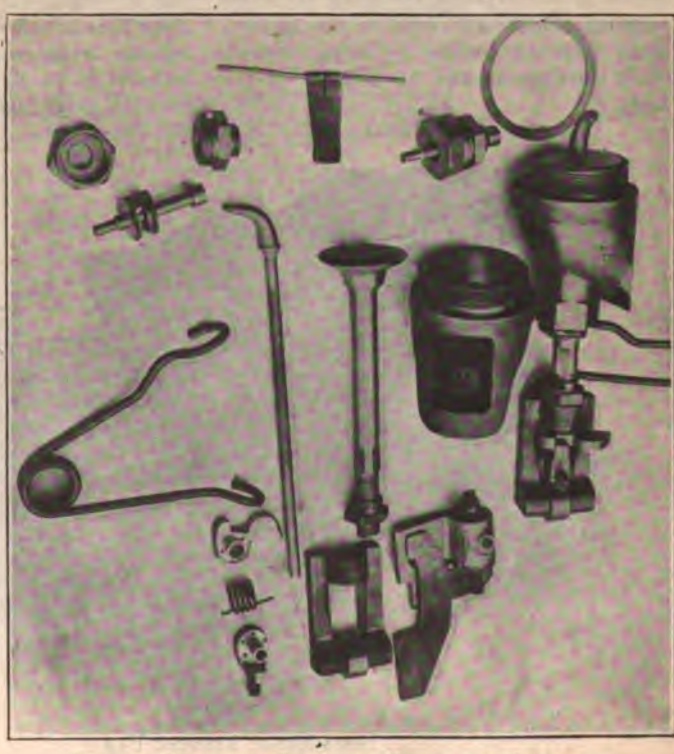


FIG. 7.—PARTS OF EXHAUST VALVE AND IGNITER.

screw thread—a method of construction at once simple and reliable.

The firing chamber only is water jacketed, which results in a higher temperature than common being maintained. This high temperature prevents loss of power due to cooling of the working gases, and secures a very high efficiency. A flange on the crank shaft provides for the attachment of the flywheel by screws with countersunk heads secured with lock nuts; while a thread outside the flange affords attachment for the driving pinion.

Triple notches at the opposite end engage the starting crank in such a position that pushing downward on the crank throws the motor over a compression and usually starts it, a much less laborious operation than making a complete turn. The flywheel is beveled for the magneto pulley, and provided with a groove across which oil is not likely to creep, while the interior surface of the rim is likewise grooved and serves as a receptacle for stray oil while running, which will drip to the ground when standing instead of being thrown while running around the interior of the body.

(To be continued.)

NEW VEHICLES AND PARTS.

The Premier Motor Car.

The Premier Motor Manufacturing Company, of Indianapolis, Ind., send us some photographs of their gasoline cars, and some descriptive data as follows:

PREMIER GASOLINE MOTOR CAR.

The motor is a double cylinder vertical one with 5x6 cylinders, located in front. The intake and exhaust valves are located on opposite sides of the cylinders, and are mechanically operated and interchangeable. A fairly high compression is used. Ignition is by jump spark. The speed of the engine is controlled by a throttle governor, which keeps the engine speed constant while the car is running and cuts out explosions when the car is at rest.

A large diameter, wide face cone clutch is used for transmitting the power. The transmission is of the sliding gear type, giving three speeds forward and reverse, and driving direct on the high gear. The three speeds and reverse are all controlled by one lever, which automatically interlocks with the clutch lever, making it impossible to change the gear without first disengaging the clutch. The gears are of coarse pitch and wide face, and the rear axle drive is by Cardan shaft and bevel gears.

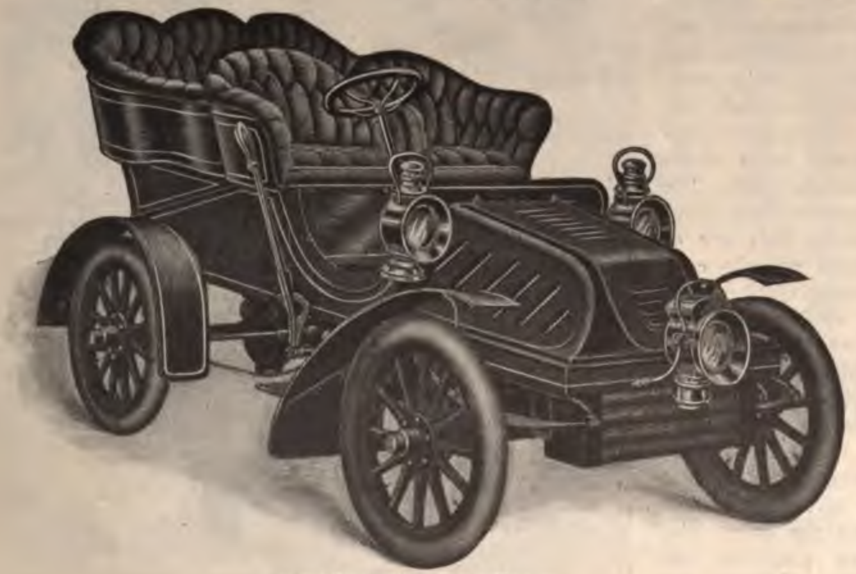
In addition to the regular foot brake on the rear of the transmission case, there is a large diameter, internally expanding, rear hub emergency brake.

The frame of the Premier is of pressed steel, suspended on 40 inch semi-elliptic springs. The wheel base is 88 inches and the tread standard. The wheels are 34 inches in diameter, equipped with 3½ inch clincher tires.

A careful study has been made of the proper location of the seats, to avoid as far as possible the "teeter board" effect in the tonneau; hence the tonneau of the Premier does not extend beyond the rear extremity of the rear wheels.

The 1903 Model Touring Car.

We give herewith some illustrations of the gasoline car and parts built by the Model Gas Engine Company, of Auburn, Ind. This car is equipped with a 16 horse power double opposed cylinder gasoline engine, located centrally in the car. The engine is of the long stroke type, and is in general similar to the stationary engines of the same company, except that it has been adopted to carriage purposes. The company state that in their experience in building stationary engines they have found a long stroke to be much superior to a short stroke.



1903 MODEL TOURING CAR.

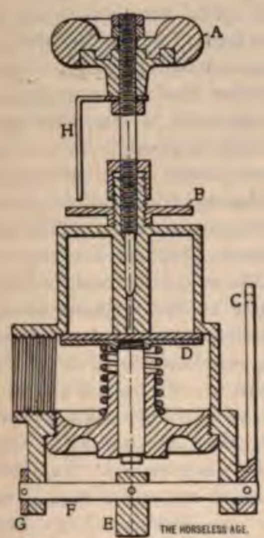
One of the novel features of the power equipment is the carburetor, illustrated in Fig. 2. In this figure A represents a thumb wheel at the end of the gasoline needle valve, which enters the carburetor centrally on top. To the needle valve is fixed an indicator hand H to adjust the valve by. The carburetor proper is composed of two chambers, one vertically above the other, separated by a flat seat poppet valve. The air enters the carburetor through the wall of the chamber and the gasoline is expanded on the top surface of the flat poppet valve when the latter is drawn off its seat by the suction in the engine cylinder. The stem of the flat poppet valve extends through a boss in the lower wall of the carburetor, and centrally across the lower wall of the carburetor extends a shaft F mounted in bearings, depending from the carburetor casting and held in place against longitudinal movement by the collar G and the hub of the lever C. At the middle of this shaft is fastened to it an eccentric E, which limits the lift of the valve D. This eccentric can be rotated by means of a lever C, and thus the lift of the valve D be varied at will. Hence the eccentric E, shaft F and lever C form a throttling arrangement by which the admission of the charge to the engine can be regulated. To the top of the carburetor is fixed a dial plate B, which in connection with the indicating hand H serves to adjust the gasoline feed.

The change gear is also of a novel construction, and is shown in section in Fig.

3. It gives two forward speeds and one reverse, and operates on the principle of a sliding key. In the drawing F is an extension of the motor shaft, upon which is loosely mounted the drum A of a piston clutch. Keyed to this shaft is a case V, to which the friction shoe W is fastened. The clutch is operated by means of the sliding collar U.

To the hub of the clutch drum A are keyed three gears, B, C and D. Parallel with the shaft F is mounted a second shaft I, with a deep keyway cut into it. Upon this shaft are mounted, loosely, three gears, P, O and N, corresponding to the gears B, C and D on the shaft. Each of the gears P, O and N is fitted with a tool steel bushing M, which is hardened before being put in place, and has a keyway cut on its bore. On each side of the hub of each of the gears is placed a hardened tool steel collar X.

In the keyway in the shaft I is located the long sliding key J, which is operated



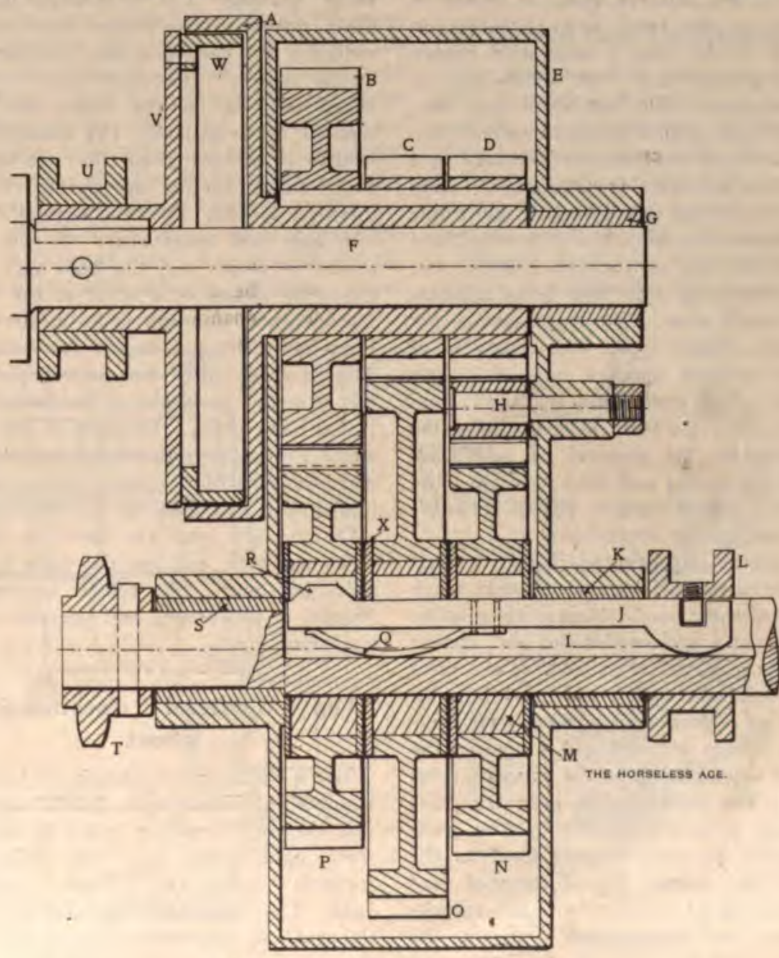
THE "MODEL" CARBURETOR.

by means of the grooved collar L. This key is made with a projection R, which is forced into the keyway of the gear over it by the flat spring Q. The ends of the projection R are beveled, and when the key is forced in one direction or another this beveled portion passes under the collars X and causes the key to pass below the surface of the shaft I, against the pressure of the spring Q. In this manner one gear is entirely disengaged before another is thrown in. When the key is directly below the collars X the shaft I will remain stationary, even if the friction clutch be thrown in. The gears, of course, remain constantly in mesh.

The driven shaft, the key and the collars M are all made of tool steel and hardened. The gears are made of brass and cut with six pitch teeth. It is claimed that in an emergency, in case of failure of the brake, the reverse gear can be thrown in and the vehicle stopped almost instantly. The gears are entirely inclosed and run in oil. The friction clutch is of a design which can be readily adjusted for wear, needing adjustment only in a single place, and that easily accessible. The sprocket T can be easily replaced with one of different size, if it is desired to change the speed of the car.

The car is fitted with a 16 horse power engine, and weighs complete 1,500 pounds.

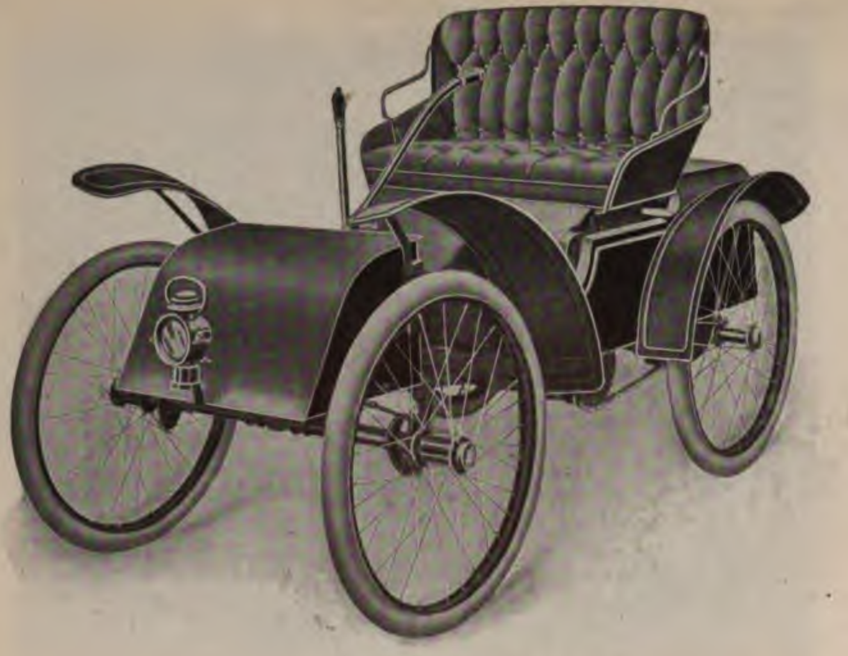
NEW UPTON DELIVERY WAGON.



THE "MODEL" CHANGE GEAR.

The Upton Gasoline Delivery.

The delivery wagon of the Upton Machine Works, of Beverly, Mass., which has just been constructed for Messrs. Houghton & Dutton, of Boston, was present at the scene of the Commercial Vehicle Contest, but was not entered owing to its hav-



THE "MICHIGAN."

ing been finished too late for the event. The vehicle is designed for a dead load of from 1 to 1½ tons, and differs considerably from the vehicles for a similar service which this company has heretofore constructed. Its weight is 4,000 pounds approximately, the wheel base is 7 feet 2 inches and the tread is 5 feet 7 inches. It is equipped with wheels of the artillery type, 40 inches in diameter in the front and 44 inches in diameter in the rear, 3 inch solid rubber tires being employed. The wheels run on roller bearings. The rear dead axle supports the load upon a platform spring composed of three semi-elliptic portions, and the driving sprockets are strapped securely to the hubs of the rear wheels. The frame is of channel iron, sheathed with wood, and distance rods are used to attach both axles to the frame, the rear ones being adjustable for chain wear. The front springs are of double elliptic type. The motor is of the two cylinder opposed type of 5 inch bore and 5 inch stroke, and is placed transversely across the body directly under the footboard, by the removal of which all parts of the motor and the single De Dion carburetor, which supplies gas to both cylinders, are readily accessible.

The engine is lubricated in all its parts by a magazine lubricator within easy reach of the operator, and obtains its gasoline supply from a tank under the seat, having a capacity of about 20 gallons. The engine is connected through a universal joint to a standard Upton transmission gear, giving two speeds forward and a reverse, the forward speeds being in the ratio of three to one. The transmission gear transmits its power to a countershaft held in plain bearings by massive hangers fixed to the channel iron frame. The differential gear is carried on the countershaft, and sprockets upon the countershaft transmit the power to the rear wheels by means of Diamond chains. The muffler is of the Upton Company's own manufacture, as well as the differential gear.

A single foot pedal operates a double acting band brake upon a drum secured to each of the rear wheels. The steering is by means of a hand wheel through a vertical steering column and a worm and sector gearing. The circulating pump is chain driven to the engine shaft and the radiators are carried in the extreme front of the vehicle. The water tank is carried under the rear of the frame and has a capacity of 22 gallons. The control of the vehicle is centred about the steering column, which carries the spark advancer, mixture throttle and air regulator. The low gear and reverse are thrown in by means of pedals and the high gear is engaged by means of a lever at the left of the operator. Ignition is by means of the jump spark from a duplex American coil. The carrying space for merchandise is 4 feet 9 inches in height, 4 feet wide and 5 feet 6 inches long. No part of the mechanism comes above the frame and the body may be removed without disturbing the mechanical arrangements of the vehicle.

On the low gear the speed is about 5 miles an hour and on the high gear 15 miles per hour. The vehicle is very substantial in appearance and operates quietly and smoothly.

The "Michigan" Gasoline Runabout.

The Michigan Automobile Company, Limited, of Kalamazoo, Mich., announce that they will begin to make deliveries of their light automobile, the "Michigan," formerly called the "Blood," early in June. The "Michigan" is said to be the the smallest automobile on the market at the present time. Its tread is only 36 inches and the wheel base is 54 inches, but the seat and machinery having a low centre of gravity make it as safe to ride in as the larger machines. The seat is full sized for two persons, while there is also plenty of carrying capacity for tools and luggage. The wheels are 28 inches in diameter and are shod with Dunlop tires. The engine is 3½ horse power, and is air cooled by a fan. As no water is used it can be run as well in winter as in summer, with nothing to freeze up. The engine has a suction inlet valve and a simple sparking mechanism. It runs at from 250 to 2,000 revolutions per minute. The speed of the engine is controlled by twisting the grip of the handle at the right of the seat. Pushing forward the same handle throws in the low gear clutch, while pulling the handle back engages the high gear clutch with the driving mechanism. The driving is done by means of roller chains, one countershaft and individual friction clutches, no toothed gear being used except in the Brown-Lipe equalizing gear on the rear axle. The rear axle runs on Hyatt roller bearings. The countershaft and front wheels run on ball bearings.

The muffler is of a new design, used only on this machine. The capacity of the gasoline tank is enough for over 100 miles on ordinary roads. The machine is capable of traveling up to 20 miles per hour. A slight pressure on a powerful foot brake is sufficient to stop the machine in its own length. There are two speeds forward, but no reverse, as the machine is so light it can be easily drawn backward by hand or the front part can be lifted off the ground and turned around. It will turn inside a 20 foot circle. The weight of the machine is a trifle over 400 pounds. The body is finished in black or red. Two sets of batteries, located under the seat, are furnished with each rig, besides a foot pump and all necessary tools.

French Volt and Ampere Pocket Meters.

A line of electric measuring instruments specially suitable for testing storage and dry batteries is being imported from France by Oelschlager Brothers, of 42 East Twenty-third street, New York city. These instruments are no larger than an ordinary watch, are easily manipulated and claimed to give accurate readings. They are provided with a conducting cord permanently fixed to the body. This cord is fixed to the battery and the circuit completed by means of the point on the base of the instrument, when the latter will immediately record the strength of the battery. The instruments are particularly suitable for testing the strength of ignition batteries on gasoline automobiles.

The meters are made in three different styles, with scales as follows: (1) to indicate volts, the scale reading either from 0 to 3, 0 to 6 or 0 to 15 volts; (2) to indicate amperes, the scale reading either from

10 or from 0 to 15 amperes; (3) to :ate both volts and amperes. The last ed instrument is made with two differ- scales, one indicating up to 10 volts and mperes and the other up to 12 volts 15 amperes. The instrument is said e as easily manipulated as the single type, it having but one cord with a cated end, the two ends being colored and green respectively. The red end esponds with the red scale on the top he dial showing volts; the green end esponds to the green scale indicating eres.

he same firm also imports a polarity in- tor which instantly indicates the polar- of a source of current. The positive inal is shown by a + sign and the tive terminal by a — sign.

ıler & De Gress Four Cylinder Engine.

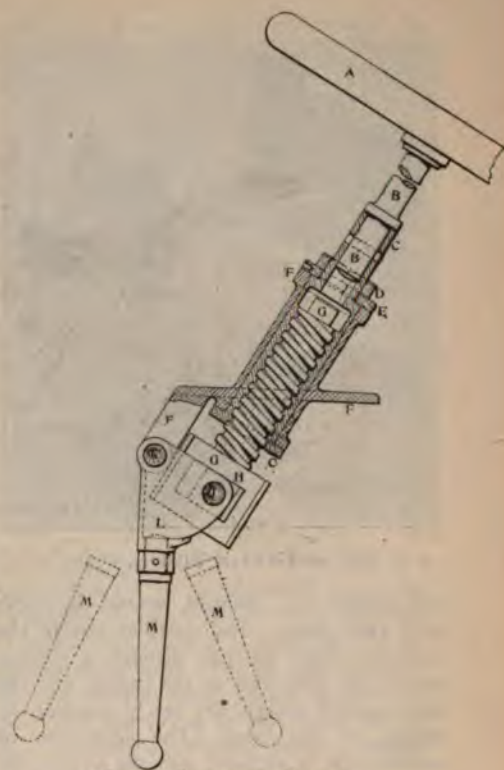
he drawing herewith shows a four cyl- r upright gasoline motor built by ıler & De Gress, Long Island City, v York, to the order of a customer. builders have decided to add the de- to their line of stock machines.

he cylinders are of 4½ inches bore and inches stroke, and the machine is said develop 20 horse power easily. It is pped with a throttle governor, and is ished full mounted, i. e., with all pipe ings, etc. The crank shaft is a steel ing, and has a bearing between each of cranks—that is, five bearings in all. he three centre bearings are contained he upper half of the base (which is of ninum), allowing the lower half of the to be removed with the crank shaft lace. The centre of the base has a d wall, which prevents oil splashing n one oil chamber to the other. The shafts are fully enclosed in the upper , with their driving gears also en- ed in the base.

The valves are all mechanically operated, and the inlet valves are interchangeable with exhaust valves. The cylinders are cast separate, which has the advantage of allowing a centre bearing between crank pins, an equal length of bearing on either side of the centre line of the connecting rod and saving in loss of castings. The only disadvantages in the unit cylinder system are the extra pipe joints and the loss of about 1 inch space in length. The heads, valve chamber, etc., are cast integral. Lubrication is by gravity from a multiple oil tank bolted to the top of the cylinder, which feeds the cylinders and the two outer crank bearings. The centre crank bearings and connecting rod bearings are provided with liberal oil catchers, and are supplied by splash system. Stand pipes in the bottom of the base regulate the quantity of oil. The weight of the motor complete, with fly in the base wheel, is 430 pounds.

The Milne Steering Check.

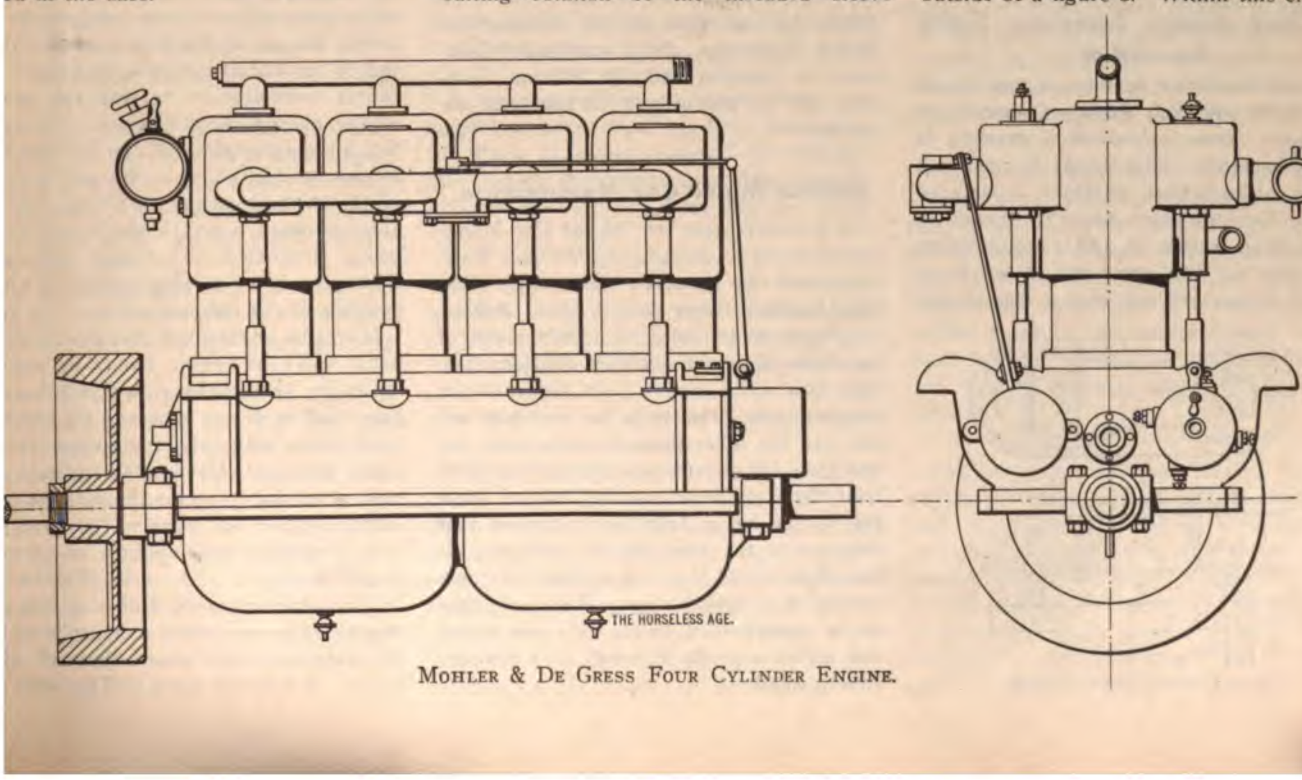
The irreversible steering mechanism of Frank Milne, Everett, Mass., comprises a base F, which is secured to the footboard or frame of the vehicle. Within the cylindrical shell of this base is located a long nut or threaded sleeve C held against longitudinal movement by a flange at the lower end, and a nut E and lock nut D at the upper. The sleeve C is fastened to the steering post B by means of a taper pin, and the steering post carries at its upper end the steering wheel A. Within the threaded sleeve is located a threaded stud G with a block at its lower end, this block being provided with a slot. Pivoted to the base F is a sector L into which is fastened a lever arm M. The sector is also pivotally secured to the sliding block H within the slot of the block G. It will be apparent that if the hand wheel A is rotated, the resulting rotation of the threaded sleeve causes the stud G to move up and down and the sector L and arm M to rock about the pivot K on the base F. The dotted lines show the two extreme positions of the lever M.



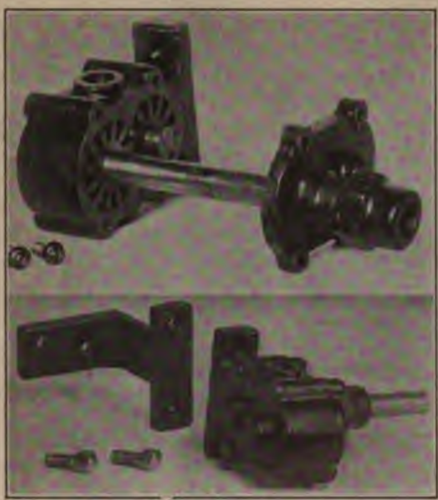
Milne Steering Check.

The Garvin Gear Circulating Pump.

We print herewith an illustration of the gear circulating pump for gasoline automobiles manufactured by the Garvin Machine Company, New York. For the benefit of those not familiar with the principle of this type of pump it may be explained that the pump consists of a casing having a chamber similar in cross section to the outside of a figure 8. Within this chamber



Mohler & De Gress Four Cylinder Engine.



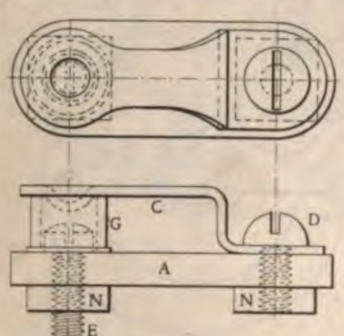
GARVIN PUMP.

are placed two toothed wheels in mesh with each other. The shaft of one of the toothed wheels extends through a stuffing box in the side wall of the casing, and the two toothed wheels are set in rotation by means of this shaft. The admission or suction pipe is screwed into the wall of the casing centrally below the gear wheels, and as the latter revolve—one right handedly and the other left handedly—the spaces between neighboring teeth and the chamber wall fill up with water. The water is thus carried to the top of the chamber and is forced out through the discharge pipe secured there. As at the centre of the chamber the spaces between neighboring teeth of one wheel are filled by a tooth of the other wheel no water can return to the bottom that way.

One of the end walls is made separate from the casing proper and is secured to it by means of four machine screws. By removing these screws all the parts can be taken apart.

The Star Supply Company Spark Intensifier.

A very small and neat spark gap device is made by the Star Supply Company, of Attleboro, Mass., of which a drawing is shown herewith. The device comprises a base A of hard fibre, to which is fastened a strip C of nickeled brass by means of the machine screw D and corresponding brass nut N. The outer end of the brass strip C is stamped out with a cup shaped



STAR SPARK INTENSIFIER.

projection, which fits into the end of a short glass tube G, holding it in place by the spring pressure of the strip C. Within the glass tube G is located the head of the screw E, which passes through the base A and is secured thereto by means of a brass nut N. The current is led into the device by one of the two screws and passes out by the other, and the gap is formed between the cup shaped projection on strip C and the head of the screw E. The glass tube G rests on a washer of some flexible material. The device measures only 1¼ inches in length.

Property Owners Thank Automobilists.

Owing to the public spirit of certain automobilists, the Congressional Committee on Rivers and Harbors, which visited this city on the 5th and 6th of last month and inspected its waterways with a view of making adequate provision for the improvement of New York harbor in the next river and harbor bill, were enabled to see a large part of the boroughs of Manhattan and the Bronx on the second day of their visit. About twenty-five automobiles were supplied gratuitously for the use of the Congressional committee, and at a recent meeting of the committee of the property owners' associations, which were instrumental in bringing the committee here, the following resolutions were passed:

Resolved, That the thanks of the joint committee on needs of the Eighteenth Congressional district be extended to the Automobile Club of America, and especially to Mr. Jefferson Seligman and Messrs. S. R. Benjamin and William Guggenheim and Mr. Harlan W. Whipple for the loan of motor cars for use of the Congressional Committee on Rivers and Harbors during its recent visit to this city; and also that the thanks of the committee be extended to the Commercial Motor Company, the Locomobile Company of America and the Winton Company for the use of cars on the same occasion.

British Motor Car Manufacture.

In a recent paper on "Motor Car Manufacture in Great Britain," by William Weir, it is stated that there are about thirty-eight firms building motor cars in Great Britain, or alleged to be doing so. Only seven of the firms merit the slightest consideration. One firm alone builds over 500 cars per annum; three firms build between 300 and 400, and the other three firms between 100 and 150. Of these seven firms, six built at least three different models, and of these six it has never been demonstrated that they are in the least degree profitable, although it is said that one of them has now arrived at a paying stage. With reference to the exception, it builds only one model and makes a profit, although it is comparatively small.

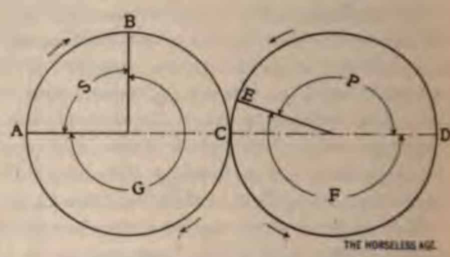
..COMMUNICATIONS..

Exhaust Control vs. Charge Control.

Editor HORSELESS AGE:

In discussing methods of control of gasoline motors, a number of writers in THE HORSELESS AGE have stated that control of the speed and power by charge throttling was not advantageous, and that control by means of the exhaust was better, as then the motor would work with uniform compression at all times. They failed, however, to go into details and to demonstrate the difference.

I think it would be of interest to your readers, and therefore suggest a theoretical discussion by one of your staff of the relative economy of two motors, identical in every respect except as to method of control. Let us say 4 inches diameter of cylinder, 5 inch stroke, automatic inlet



S, suction stroke; *G*, exhaust stroke; *F*, compression stroke; *P*, power stroke.

valve, compression five volumes to one, and ignition at end of compression stroke or under control of a governor according to speed.

Referring to the diagram, engine No. 1 will always exhaust from one-quarter inch before the end of the power stroke till the end of the exhaust stroke, or from *e* to *a*, and is controlled by varying the opening of the charge throttle valve. In engine No. 2 the exhaust valve can be held open, as may be desired, to as far as the middle of the suction stroke, or from *e* to any point between *a* and *b*, the throttle valve being eliminated or always wide open. Control only by varying length of time of opening of the exhaust valve.

It will be understood that should the exhaust valve of engine No. 2 be open, as far as any point between *a* and *b* the spent gases will be drawn back and the automatic inlet valve will only open when the exhaust valve has closed, allowing fresh mixture to be drawn in for the balance of the suction stroke, but there will be practically a full cylinder and uniform compression at all times.

H. W. STRUSS.

[The ordinary method of controlling the engine by means of the exhaust is to close the exhaust valve before the end of the stroke instead of after. The difference

seem to be that when the exhaust is kept open till after the end of the and the burnt gases are first ex- and then drawn back into the cyl- the latter will work at a somewhat temperature, and probably not so water will be boiled away.—Ed.]

Truth Wanted on Fuel Consumption.

Horseless Age:

a person of nervous temperament a part of the pleasure of automobiling through the anxiety as to where the upply of water and gasoline is to be ed. In making short trips about his amounts to but little, but in mak- ng trips it gets to be a positive nui- The more miles one can make it having to take on further supplies er and gasoline the less this nuisance ies.

the point on which the truth is d is how many miles of ordinary such as we have about here (Maine), to be made to the gallon of gasoline, steam carriage weighing 800 pounds anks filled.

machine is in perfect order, so far an see. There is no leakage around rods or valve stems. The pistons ht in the cylinders, and the carriage so easy that it takes very little to t along by hand.

m 7 to 8 miles to the gallon is all I een able to make so far, and I want perience of others, with the same of machine. There are two ma- on the market almost identical in uction and name. My machine is e with the longer name.

slide valve has nearly one-sixteenth ad, which I consider excessive, and the only thing about it that I can e from my standpoint.

n the amount of water used the and burner seem to be doing well no trouble in keeping steam), and I the engine for better results if any be obtained.

rry 175 pounds of steam and pump el to the burner with a well known pump that keeps a steady pressure pounds. The burner has seen two s' work and is on the third, but the re all tight.

e given full data and now ask the of The Horseless Age what my nove shall be to get more mileage llon.

ould like to get into the class of obilists who tell me that they get o to 15 miles per gallon; or, failing should like the experience of oth- my present class, as "misery loves ny." T. J. F.

Moyea Automobile Company, New will establish a repair and storage nent, and pending the completion of building has rented the premises West Forty-ninth street.

...OUR... FOREIGN EXCHANGES

German Imports and Exports of Automobiles.

The export of automobiles from the German Empire during the first three months of 1903 shows a considerable increase, according to *Automobil Welt*. The amount of the exports is given in terms of a unit of weight, 100 kilogs. (dz.) or 220 pounds, and the value is also given. Pleasure vehicles were exported to the amount of 1,288 dz., valued at 1,159,000 marks, compared to 745 dz., valued at 671,000 marks, during the same period in 1902, and 628 dz., valued at 377,000 marks, in 1901. France took 318 dz., against 119 dz. last year; England, 260 dz., against 229 dz. last year and 166 dz. in 1901; Austria-Hungary, 72 dz., against 205 dz. in 1902 and 49 dz. in 1901.

Motor wagons for carrying merchandise were exported during the first three months of this year to the amount of 518 dz., valued at 277,000 marks, compared to 196 dz., valued at 78,000 marks, in 1902, and 110 dz., valued at 44,000 marks, in 1901. In 1903 440 dz. of these went to Great Britain; in 1902, 81 dz. and in 1901, 22 dz. Austria took only 12 dz., compared to 74 dz. in 1902 and 32 dz. in 1901.

The importation of pleasure cars has also largely increased, especially from France, from where this year 1,096 dz. were imported, compared to 624 dz. in 1902 and 264 dz. in 1901. The total importation of pleasure vehicles was 1,325 dz., valued at 1,193,000 marks, compared to 812 dz., valued at 731,000 marks, in 1902, and 356 dz., valued at 214,000 marks, in 1901.

Of other motor vehicles there was imported a total of 154 dz., valued at 62,000 marks, compared to 110 dz., valued at 44,000 marks, in 1902, and 102 dz., valued at 41,000 marks, in 1901.

A monster petition, to which 10,000 signatures are appended, has been handed to the Paris Municipal Council by automobile owners protesting against the penalty of imprisonment for exceeding the speed limit.

The automobile industry in Germany was fully employed in 1902, according to the British Consul General at Berlin, and both pleasure and business wagons are steadily increasing in number in the empire. Gasoline vehicles are predominating.

The *Central Zeitung für Optik und Mechanik* states that a new metal has been discovered which will be put on the market under the name of meteorite. It is a compound of aluminum, is just as light in weight as aluminum itself, and proof against chemical influences. At the same time it is extremely pliable, so that it can be used for pipes, wiring, horseshoes and in all cases where brass is now used. Its weight is one-third that of brass and its price the same.

Robert E. Phillips will be in charge of the timing in the Gordon Bennett Cup Race and all other events of the Irish fortnight.

The English Premier has been fined a third time for furiously driving his automobile, and the London *Daily Express* refers to him as "incorrigible."

According to a report of the British consul twenty-eight automobiles were imported into Buenos Ayres last year. Appreciation of their value seems to be extending.

It is suggested in the *Autocar* that if a steep grade is to be ascended by a car the brakes of which do not hold perfectly for backward motion it is better to run upon the reverse gear. In that case not only will the brakes hold better should the power fail, but it can be run down the hill again in safety by steering forward instead of backward.

Many complaints have been received by the (British) National Cyclists' Union regarding the high speed of automobiles and that they cut cyclists dangerously close, and at the recent general committee meeting the following resolution was passed: "The N. C. U. is prepared to consider the question of taking up the case of any cyclists who have been injured by the furious driving of motor cars."

Captain Deasey has accomplished the longest motor run without a stop yet made in the United Kingdom. He left the Automobile Club in Piccadilly ten minutes after midnight on Saturday, May 9, in a 20 horse power Rochet-Schneider car, and reached Glasgow at 9:30 Sunday evening, having covered a distance of 450 miles in 21 hours 20 minutes without stopping the motion of the engine or the car.

The French Government has agreed to accept from tourists in France driving certificates issued by the A. C. G. B. I., and also to accept "declarations" from English automobile manufacturers the same as from home manufacturers, so that after a certain make of car has once been registered by the authorities its introduction into France presents absolutely no difficulties.

The motor car is to be blamed for the decline of coaching. It may be magnificent to smack the whip at a turnout of spanking thoroughbreds, and to set them galloping; but still more magnificent it is in the eyes of the up to date fashionable sportsman to dash along * * * in an automobile. Motor carring is all the craze just now, and it is not to be wondered that

coaching should suffer.—*Newcastle Daily News.*

The Beckenham (England) urban district council are prepared to consider tenders for a motor steam fire engine. Tenders must be in by June 1.

In trying a Mercedes car which he was to drive in the Paris-Madrid race, Herr Paul Albert, a German automobilist, was killed at Niederingenheim recently.

In a recent paper on the automobile industry in Great Britain it is stated that that country appears to build about 2,500 automobiles per annum, and imports 3,500.

The German Automobile Club has decided to allow Mr. Foxhall Keene to drive a 90 horse power Mercedes car in the Gordon Bennett Cup race in place of Mr. Werner.

The series of entertainments arranged at Madrid for the participants in the Paris-Madrid race included an excursion on May 30 to Aranjuez, where there was to be a bull fight. The next day there was to be a bull fight in the Madrid Plaza de Toros.

On May 12 the "Societa Italiana di Motori Daimler" was organized in Milan, Italy, to manufacture and trade in automobile motors and machines using such motors. Felice Grondona is president and the board of directors includes Messrs. Gustav Fischer and Max Duttenhofer, of the Cannstatt firm.

The Irish Government has decided to form a motor bicycle corps in connection with the Royal Irish constabulary. For the most part the duties of the men will be to furnish an escort to the Lord Lieutenant during his automobile tours, and when the King visits Ireland in August he will be attended by the full escort if he takes any motor car excursions.

G. A. Barnes made a successful attempt on the hour motor bicycle record from a standing start on May 13 at Canning Town track. From the 28th mile to the end of his journey he established new records. In the half hour he rode 24½ miles, and at the end of the hour he had ridden 48 miles 1,395 yards. F. W. Chase, who previously hold the record for the hour, covered 44 miles 210 yards for the period.

In the British House of Commons on May 18 it was stated by Austen Chamberlain that the motor vans which had been used for the conveyance of parcel mails between Liverpool and Manchester from May 1 to June 20, 1902, and from November 23 to the present time, broke down on thirty-one occasions. On eighteen of these occasions the mails had to be transferred to other vehicles. On the other thirteen occasions the motor vans were able to complete the service after some delay. The delay in the arrival of the mails varied from thirty-two minutes to four hours and twenty-nine minutes.

The *Electrical Times*, London, is compiling a list of stations for charging automobile accumulators throughout England and Wales.

A service is shortly to be introduced in the Eastern Counties, England, of steam motor wagons with trailers attached to convey goods between London, Colchester, Ipswich, Bury St. Edmunds, Yarmouth, Peterborough, Norwich and King's Lynn. A dozen steam cars, each carrying 6 tons, and sixteen smaller vehicles will be employed.

The police in Belfast have been demanding the names and occupations of all persons using motor cycles. Complaints have been made that motor cycles were being driven at an excessive speed through the streets, and that the riders refused to stop when requested to do so. The police have accordingly taken the names of persons using these cycles in order to supply them with copies of the regulations issued by the Local Government Board on the subject.

"It is not surprising," says an English automobilist, "that a large and increasing number of automobilists cross to France when they desire an extended tour. The cost of transporting the car across the Channel is more than balanced by the saving effected in the way of fines and hotel expenses."—From this it would seem that fines are considered one of the stable expenses of an automobile tour in England.

Registering Under the Bailey Law

The A. C. A. sends out the following to members:

In order to operate an automobile in the State of New York owners must comply at once with the following regulations:

Manufacturers and dealers are required to register only such cars as they operate for their own private use.

REGISTRATION BY AUTOMOBILE OWNERS.

First—If you have already registered prior to the passage of the Doughty-Bailey law on April 23, 1903, you should return to the Hon. John F. O'Brien, Secretary of State, Albany, N. Y., the certificate previously issued to you for the purpose of having the same numbered, for which no further fee is charged.

Second—If you have not previously registered, fill out and sign the enclosed white blank and forward to the Secretary of State, Albany, N. Y., together with the fee of $1.

Separate blanks must be made out for each automobile.

Third—The number of the certificate issued by the Secretary of State must be displayed on the back of your automobile in Arabic numerals, black on a white ground, each not less than 3 inches in height, and each stroke to be of a width not less than one-half inch.

If the initials "N. Y." are carried in a conspicuous manner on the back of the vehicle in connection with the number, exemption from registration in the State of Connecticut is thereby secured.

REGISTRATION BY AUTOMOBILE OPERATORS (MECHANICS OR EMPLOYEES ONLY).

Every person operating an automobile as mechanic, employee or for hire should fill out and sign the enclosed pink blank and forward to the Secretary of State, Albany, N. Y., together with the fee of $1.

He must at all times when operating an automobile carry with him the certificate issued by the Secretary of State.

STATEMENT OF OWNER OF AUTOMOBILE FOR CERTIFICATE OF REGISTRATION.

To the Secretary of State, Albany, N. Y.:

DEAR SIR—I hereby make application for a certificate of registration as owner of an automobile or motor vehicle, and pursuant to the provisions of Section 166 of the Highway Law, I make the following statement in which I have given my name and address, and also a brief description of the character of such vehicle, as follows, viz.:

Name ....
Address ....

DESCRIPTION OF AUTOMOBILE.

Trade name......................
Style ....
Seating capacity..................
Motive power.....................
Factory number...................
Made by..........................

Dated.............190

....
Owner.

Note—Fill out and forward to Hon. John F. O'Brien, Secretary of State, Albany, N. Y., with $1, the fee for registration.

STATEMENT OF AUTOMOBILE OPERATOR FOR CERTIFICATE OF REGISTRATION.

To the Secretary of State, Albany, N. Y.:

DEAR SIR—I hereby make application for a certificate of registration as an automobile operator, and pursuant to the provisions of Section 166 of the Highway Law I make the following statement in which I have given my name and address, and also a description of the character of the machine which I am enabled to operate, viz.:

Name ....
Address ....

DESCRIPTION OF MACHINE.

Trade name......................
Style ....
Motive power.....................
(Fill in electricity, gasoline, steam, one or all.)

Dated.............190

....
Operator.

Note—Fill out and forward to Hon. John F. O'Brien, Secretary of State, Albany, N. Y., with $1, the fee for registration.

Club Notes.

SHEBOYGAN A. C.

e Sheboygan (Wis.) Automobile Club been organized with a membership of 'e.

GENEVA A. C.

rangements are being made for the iization of an automobile club at va, N. Y. Hugh L. Rose is the pro-r.

A. C. OF PITTSBURG.

is stated that a business man of Pitts-, who is much interested in its affairs, offered to build a clubhouse. The club has 100 members.

A. C. OF ST. LOUIS.

is reported that the club is preparing campaign both of offense and defense ist the Missouri automobile law, which effect next month.

A. C. OF BUFFALO.

ie club has decided to hold a banquet, hich will be invited all persons inter-l in automobiles, whether they own a iine or not. The purpose is to arouse waning interest in the club.

MASSACHUSETTS A. C.

ie winners in the recent hill climbing est were the guests at luncheon of the sachusetts Automobile Club, Boston, he evening of May 14. Prizes in the e of specially engraved cups were 1.

BRONX A. C.

ie run of the club on May 31 was ged from Bayside to City Island on unt of recent experiences by some of members on Long Island roads at the s of the officers of the law. The club has thirty-eight members.

ITHACA A. C.

enjamin L. Johnson and George F. te, of Ithaca, N. Y., issued a call for eeting of automobilists on May 27 for purpose of organizing an automobile . About twenty-five automobiles are to be now owned in Ithaca.

NEW YORK M. C. C.

ie New York Motor Cycle Club will perate with the Metropole Cycling in an endurance run on July 3, 4 and om New York to Boston and return. start will be made at 4 a. m. Entries on June 27. E. L. Ferguson, Sev-avenue and 126th street, New York, iairman of the joint committee. Gold als will be awarded to the winners.

NASHVILLE A. C.

club has been organized at Nashville, n., but at this writing it is understood iame has been decided upon. Nash-Automobile Club, Automobile Club Tennessee and Southern Automobile are among the names suggested. matter will be decided at the next ting. Mr. Andrews, Jordan Stokes and A. H. Crutcher were appointed a committee on constitution and bylaws.

BUFFALO A. C.

A meeting of the club was held on May 18 to elect a new board of governors in place of the former board, the members of which had resigned, but as there was no quorum the election was delayed. The members of the board declared that there was a lack of interest and that the members at large left the work to four or five. The old board consisted of H. A. Meldrum, vice president; John M. Satterfield, secretary; E. R. Thomas, treasurer; Dr. Lee H. Smith, A. E. Hall and George S. Metcalfe. The club is also without a president, as one has never been elected in place of Ellicott Evans, resigned.

CLEVELAND A. C.

A farewell reception was tendered by the Cleveland (Ohio) Automobile Club on May 26 to the American team in the Gordon Bennett automobile race. Percy Owen was unable to be present, but he sent a telegram of regret. About thirty automobilists beside the invited guests were gathered around the tables. Among the decorations were three miniature floral automobiles, representative of Winton's "Bullet II" and Messrs. Mooers' and Owen's racing machines, respectively. President Reese made an address of welcome, to which Messrs. Owen and Mooers responded. Other speeches were made by J. Hartness Brown, Charles B. Shanks, Thomas E. Rook, Rollo White and Leo Melzanowski.

LONG ISLAND A. C.

The Long Island Automobile Club held its floral parade on May 23, about thirty gaily decorated machines participating. The vehicles assembled at the clubhouse, 32 Hanson place, Brooklyn, and proceeded down Bedford avenue to the Eastern Parkway, to the Boulevard, to Beverly road; thence through Ocean avenue, and by return to the Park and via Berkeley place, to Sixth avenue, to Flatbush avenue, to the clubhouse, where a dainty informal collation was served.

The silver cup was awarded to Lawrence Abraham, who drove a Winton touring car, which was decorated most profusely with bunting and flowers. The cup bore the following inscription: "Long Island Automobile Club Parade, May 23, 1903; awarded for most attractive car," and a miniature of the club's badge.

The judges of the competition were L. R. Adams, Lieut. A. R. Pardington and W. W. Melvin.

DAYTON A. C.

At a meeting of the club, on May 19, the following list of races, to be held at the Fair Grounds on Memorial Day, was decided upon: (1) Electric, 2 miles; (2) gasoline, 1,000 pounds and under, fully equipped, 3 miles; (3) gasoline, 1,000 pounds and under, stripped or otherwise, 3 miles; (4) steam, 2 miles; (5) motor cycles, 5 miles; (6) gasoline, 1,500 pounds and under, fully equipped, 3 miles; (7) gasoline, 1,500 pounds and under, stripped or otherwise, 3 miles; (8) open for all machines, 5 miles; (9) gasoline, 2,000 pounds and under, fully equipped, 3 miles; (10) gasoline, 2,000 pounds and under, stripped or otherwise, 3 miles; (11) gasoline, 2,000 pounds and over, fully equipped, 5 miles; (12) gasoline, 2,000 pounds and over, stripped or otherwise, 5 miles; (13) pursuit race by three fastest machines during the day.

New insignia to be worn on the cap was issued to members. It consists of a gold plated model, the centre of which is a small automobile wheel, which is surrounded by fancy scroll work, and under which are the letters "D. A. C." in black enamel.

TOLEDO A. C.

The annual meeting of the club was held on May 16 and the following officers were elected: Dr. L. A. Liffring, president; Peter Gendron, vice president, and George Palmer, Jr., secretary and treasurer. Trustees were appointed as follows: Frank Hake, George R. Ford, C. M. Hall, H. C. Tillotson, W. D. McNaul, J. M. Goutz and George Troutt. Following are the committees: Membership—Dr. C. P. Wagar, Ezra Kirk and J. M. Bick; Tours and Contests—George Troutt, George R. Ford and Guy R. Ford; Auditing—D. R. Gamble, Harry Fisher and Louis Lichtie; Grievance—C. M. Hall, Frank Hake, Ezra Kirk; Entertainment—George R. Ford, George Troutt and George Palmer, Jr.

Several new members were elected. It is the intention of the club to arrange for race meetings this summer at which prizes will be awarded the winners by the point system.

In response to a communication from the Chicago Automobile Club in regard to the proposed New York-Chicago endurance contest, the secre'ary was instructed to notify the C. A. C. that the T. A. C. would do all in its power to aid the run while en route through Toledo.

A. C. A. Affairs.

A loving cup was presented by the governors of the club to President Albert R. Shattuck on the occasion of his departure for Europe as a mark of appreciation of his services during his presidency for the past three years. The governors and the chairmen of the standing committees waited upon Mr. Shattuck at his residence. Jefferson Seligman, acting as spokesman, dubbed Mr. Shattuck the "pioneer automobilist," and Col. John Jacob Astor called attention to Mr. Shattuck's untiring work in behalf of good roads. Remarks were also made by some of the others present.

The plan of campaign for testing the New York automobile law, which the law committee recently submitted to the board of governors, has proved acceptable to the board, and at a meeting last week they decided to bring the matter into the courts at the first opportunity.

Sixteen members were elected at the meeting of the board of governors on May 18.

The Glasgow-London Non-Stop Trial.

Under the auspices of the Scottish Automobile Club (Western Section) a non-stop trial was organized between Glasgow and London on May 13 and 14 last. The object was to show that Glasgow and London are within two days' travel by motor car of each other. Speed in excess of an average of 12 miles per hour was not recognized. The rules were similar to those under which other reliability trials have been held.

The following is the system of marking for reliability adopted: A maximum number of marks is given for the run, and one mark is deducted for every minute during which the vehicle was at rest from the time of starting to the conclusion of the run, except in the case of stops for tire troubles, in respect of which one mark is deducted for each five minutes. No deductions are made for the compulsory stops at Leeds, traffic or accidental detours. There are also deducted, in addition, one mark for every minute in excess of the official maximum time for the run, the time occupied by all stops having first been added. The official maximum time is the time that was occupied by a vehicle in traversing a trial route at a maximum legal speed, plus the extra time allowed for towns and villages, and observers, carried on the cars, were directed to insist on an 8 miles per hour speed in these places. There was a minimum time for various stages in the journey, which was intimated to drivers and observers beforehand. Arrival at the end of a stage in advance of the time allowed involved immediate disqualification of the vehicle.

The number of passengers or equivalent weight carried was optional, but is mentioned on the certificates, which latter also state the total number of marks and the number allowed, and, separately, the deductions for stops other than those allowed by the rules, and for tire troubles; also the motive power, brake horse power, as stated by the manufacturer, number of passengers carried and nature of tires.

The total number of entries reached twenty-five automobiles and nine motor cycles. Of these twenty-two cars and seven motor cycles started on the first days' run from Glasgow to Leeds, a distance of 211 miles, the maximum time allowance being 18 hours and 10 minutes. The cars lined up in St. Vincent square, Glasgow, at 3:15 a. m., and starting began at 3:30, the different vehicles being sent off at intervals of only a few minutes. The starting cars varied considerably in size, a 6½ horse power Peugeot and a 24 horse power De Dietrich forming the limits as to power. The weather was not particularly favorable, a drizzling rain falling early in the morning and more later in the day. The roads were reported in fairly good condition, but the route included the climb over the Shap Fell, and was therefore not particularly easy from the standpoint of hill climbing.

The first car to reach Leeds was the 24 horse power De Dietrich, driven by Chas. Jarrott, at 3:40 p. m. The rest of the cars arrived in quick succession, and by 4:20 only three of the starters were still out. The 211 miles were therefore accomplished in about 12 hours. A police trap was encountered on the route, and one of the competitors, Miss Levitt, was stopped. At Leeds a large throng of spectators had assembled near the town hall to view the arrival of the cars.

In the start from Leeds on the morning of the 14th the vehicles left in the same order in which they had arrived the night before. The last day's run was in general easier than the first day's. Another police trap was encountered on the Great North road, 50 to 75 miles from London, and a number of competitors held up. The first vehicle to arrive in London was Chas. Jarrott's De Dietrich. Altogether nineteen out of the twenty-two starters arrived. Following is a preliminary statement of the performance of the various cars, based upon the reports of the official observers, from the *Automobile Club Journal:*

The number of passengers is shown in brackets after the name of the car.

I.—CARS MAKING A NON-STOP RUN AND SECURING FULL MARKS.

Ten horse power Lanchester (4), four cylinder Sunbeam car (4), four cylinder Sunbeam car (4), Arrol-Johnston dog cart (3), six seated Arrol-Johnston carriage (4), 10 horse power Wolseley tonneau (4) and 12 horse power Argyll (3).

II.—OTHER CARS.

Fourteen Horse Power Chenard & Walcker Tonneau (4)—The possibility of the deduction of one mark for this car for a driving stop is under consideration.

Twenty-two Horse Power Rochet & Schneider—Driving stop under consideration.

Gladiator (3)—Stop for puncture, 20 minutes; stop for battery run down, replaced by spare, 1½ minutes.

Twenty-four Horse Power De Dietrich (3)—Stop owing to petrol not reaching carburetor, 7 minutes; engine stopped momentarily when inquiring route, 1 minute; stop owing to petrol not reaching carburetor, 2 minutes.

Ten Horse Power Lanchester (4)—In reversing to return to right road, broke reverse gear, and gave up between Skipton and Leeds.

Ten Horse Power Wolseley Tonneau (Glasgow to Leeds, 3 passengers; Leeds to London, 4)—Ignition stop, 4 minutes.

Ten Horse Power Argyll (3)—Puncture stop, 15 minutes; delay in restarting engine at Leeds, 3 minutes.

Six Seated Double Phaeton, Gardner-Serpollet Steam (Glasgow to Leeds, 3; Leeds to London, 4)—Six marks will be deducted for getting up steam at Leeds.

Three Cylinder Brooke Tonneau (3)—Stopped for broken speed lever fork, 45 minutes, and for 2½ hours to replace pump, and was withdrawn at Kendal. Report not yet received.

Nine Horse Power Argyll—Car withdrawn during the trial. No records received.

Twelve Horse Power Georges Richard Light Car (3)—Tire stop, 20 minutes; tire pumped in Leeds, 2 minutes; puncture, 12 minutes; puncture, 12 minutes.

Twenty-four Horse Power Georges Richard Light Car (4)—One petrol tin containing water by mistake was emptied into tank, and caused stoppage of 3 hours 12 minutes.

Ten Horse Power De Dion-Bouton (3)—To fill tank, 2 minutes; to replace plug, 1 minute.

Peugeot, Two Seated (2)—Four stops for ignition of 3, 2, 1 and 3 minutes; two punctures, 15 and 15 minutes; one trembler replaced.

F. A. C. Tonneau—Under consideration.

A Darracq tonneau entered by W. H. Kingsbury, a tonneau car entered by J. R. Richardson & Co. (Lincoln), Limited, and a Delahaye tonneau entered by Delahaye Chief Depot did not start from Glasgow.

MOTOR BICYCLES.

A Quadrant motor bicycle made a perfect non-stop run.

Triumph—Did not arrive at Leeds. No records received from driver.

Triumph—Wired from Kirkby Lonsdale, "Stuck." No further driver's report received.

Ariel—Wired from Preston Station, "Have abandoned run." No further driver's report received.

Brown—Filled tank twice; pushed up Shap Hill; pushed up hill near Kirkby Lonsdale; stopped to lubricate; stopped to replace belt three times; stopped to adjust trembler.

Humber—Stopped to fill with gasoline 5 miles from Leeds, and in Leeds; stopped near Biggleswade to fasten plug.

Humber—Stopped 15 minutes at Welwyn to clean out carburetor; stopped 2 minutes for loose terminal.

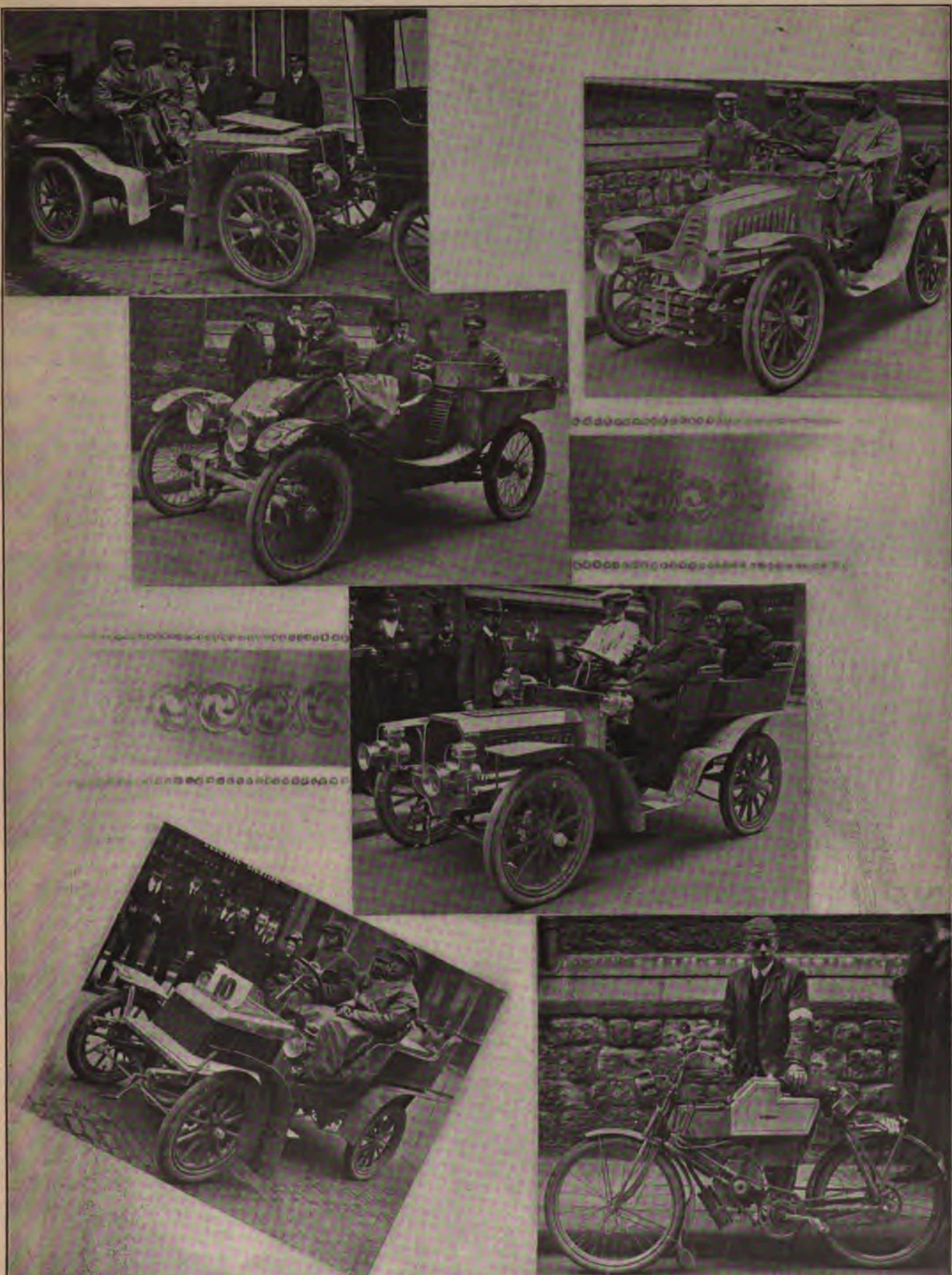
It is believed that no motor cycle came through without pedaling, but no marks are deducted and no comments made.

Two motor bicycles entered by Weller Brothers, Limited, did not start.

The Yonkers Races.

In the races held on the Empire City Mile Track, Yonkers, on Decoration Day, a number of world's records were broken. "Barney" Oldfield established a new mile track record, with the 70 horse power Cooper-Ford racer, and Albert Champion broke the records for motor bicycles recently made by Fred Chase on the Canning Town track, England, with a Clement racing bicycle.

The day was somewhat gloomy, and it threatened rain all the forenoon, but the weather cleared up about noon. An enormous crowd had gathered at the track, estimated at from 5,000 to 6,000 persons.



CHAS. JARROTT ON TWENTY-FOUR HORSE POWER DE DIETRICH.
MR. HARTENFELD ON TEN HORSE POWER LANCHESTER.
D. H. WHITESIDE ON TEN HORSE POWER ARGYLL.

J. W. STOCKS ON TWELVE HORSE POWER DE DION.
MISS DOROTHY LEVITT ON TWELVE HORSE POWER GLADIATOR.
D. GANS ON HUMBER MOTOR CYCLE.

Many of the visitors were there in automobiles, and nearly 200 cars were counted upon the lawn and in the orchard back of the grand stand. The races began at 2 o'clock p. m.

The chief event of the day was a race between "Barney" Oldfield in the 70 horse power Cooper-Ford machine and C. G. Wridgeway in a 40 horse power Peerless. The conditions called for the best two out of three 5 mile heats, the contestants starting at opposite points of the track. In the first heat Oldfield started in front of the grand stand and Wridgeway at the opposite side. Wridgeway took the lead and had gained about 100 yards on his rival at the end of the first mile, but during the second mile Oldfield made the better speed and soon took the lead, leading by a quarter of a mile at the finish. The second heat was again won by Oldfield, and the second mile of this heat was done in 1 minute 1 3-5 seconds, thus beating Alexander Winton's track record of 1 minute 2¼ seconds. The third mile was made in 1:05, the fourth in 1:05 2-5 and the fifth in 1:04 3-5.

The other new record referred to was established by Albert Champion on a four cylinder, 10 horse power Clement motor bicycle. He covered 1 mile in 1:05 and 5 miles in 5:35. Following is a summary of the other events:

The opening event for vehicles of all powers under 1,000 pounds was participated in by one steam and four gasoline machines. George C. Gould (Waltham) winner; time, 2 m. 5 s.; Dr. A. L. Nelden (Northern), second; J. J. Hickey (Autocar), third.

Three Mile Race for Gasoline Vehicles between 1,000 and 1,800 Pounds—Joseph Tracy (35 horse power Panhard), winner; time, 3 m. 50 s. A. C. Bostwick (18 horse power Mercedes), second; F. A. La Roche (12 horse power Darracq), third.

Five Mile Race for Gasoline Machines Over 1,800 Pounds, the Oldfield and Wridgeway Cars Being Barred—Joseph Tracy (35 horse power Panhard) winner; time, 6 m., 23 s.; Lawrence Waterbury (40 horse power Mercedes), second; L. Markle (18 horse power Mors), third.

Five Mile Race for Motor Bicycles—

Albert Champion Making One Mile in 1:04.

First Lap, Second Event; Tracy Leads, Bostwick Second.

Start of Third Event.

L. Markle on Eighteen Horse Power Mors.

THE YONKERS RACES.

Curtis (5 horse power Curtis) winime, 6 m., 34 s.; George N. Holden horse power Indian) second; Fred odgers (1¾ horse power Indian),

: Mile Exhibition of Motor Cycle, lbert Champion—The times at the i the different miles were as follows: mile, 1:04 1-5; 2 miles, 2:09 4-5; 3 3:15 2-5; 4 miles, 4:21 4-5; 5 miles,

: Record Trials Open to All Ma—O. W. Bright (60 horse power ·des) winner; time, 1:07; A. C. Bost- (18 horse power Morse), second; 1:12; Joseph Tracy (35 horse power rd), third; time, 1:16.

cial match between Barney Oldfield :. G. Wridgeway. Five mile heats, wo in three—First heat, Barney Oldwinner; time, 7:02 1-5; second heat, ld winner; time, 5:31.

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he Readville Track Races.

ace meet was held by the Massachu- Automobile Club on the Readville , Readville, Mass., on Decoration May 30. A crowd estimated at over people attended the races and a very number of automobiles were lined up e the track. The meet was on the well managed and the world's 1 rack record for steam carriages was n twice, which added to the interest spectators. F. E. Stanley, in a new : car of the Stanley Motor Carriage any, called the "Torpedo," covered : in 1:02 4-5, which is the new world's l, and George C. Cannon beat his ecord of last year by going a mile in -5. Following is a summary of the nt events of the day.

ee Mile Race for Stock Steamers— : Durbin (Stanley) winner; time, -5; F. A. Hinchcliffe (Locomobile), d; Louis Ross (Stanley), third; Hilliard (Stanley), dropped out. n took the lead at the start and held the finish.

e Mile Motor Cycle Contest—J. ier (1¾ horse power Indian) winime, 6:54 2-5; F. C. Hoyt (1¾ horse Indian), second; time, 7:27 4-5; Joe ey (3 horse power Orient), third.

third event was an open race for ers, and three machines had been en- a Grout, a Stanley and a White. Grout broke the connecting rod in a inary warming up; the burner on White got clogged up, and the race ore was not run.

oline Cars Under 1,000 Pounds—H. amberlain (16 horse power Darracq) r; time, 9:08; John Robbins (4 horse Waltham), second; W. Jameson (4 power Waltham), third. The feature race was the manner in which the Orient 4 horse power buckboard, cartwo men, kept up to the 16 horse Darracq, being outdistanced only 250 feet at the finish.

START OF THE THIRD RACE AT READVILLE TRACK BETWEEN STANLEY AND WHITE. STANLEY WINNER.

Ten Mile Special Race for Steam Racers.—A Grout racer, the Cannon "Flyer" and the Stanley "Torpedo" had been entered for this event. The Grout steamer broke a connecting rod in a preliminary trial and withdrew. Stanley and Cannon ran a three heat race, the last mile for the world's record. Both made the last mile in 1:06, and it was therefore a dead heat. Another attempt was made between the sixth and seventh races, and it was then that the new records were established.

Gasoline Cars Under 2,000 Pounds.—John L. Snow (20 horse power Peerless), winner, time, 7:58 3-5. K. A. Skinner (15 horse power De Dion), second; Harry Fosdick (20 horse power Winton), third. A Buffum and a Locomobile gasoline car, also entered, did not run. In this race Fosdick picked up a big horseshoe, from which a puncture resulted, and only one of Skinner's cylinders worked, but both contestants finished the race.

Race for World's Steam Track Record. —In this event both F. E. Stanley and George C. Cannon made a flying start for a one mile dash to break the world's track record for steam automobiles. Mr. Stanley had his trial first, and when he was timed it was found he had covered a mile in 1:02 4-5, thus beating the world's record by 2 7-10 seconds. Mr. Cannon also beat the world's record (held by himself and made at Providence, R. I., September 24, 1902), by going the mile in 1:04 2-5. It should be remarked that Stanley occupied his vehicle alone, while the rules under which the former records were made called for two passengers. Cannon carried a second man, and it would seem that he only officially broke the record.

Massachusetts Automobile Club Invitation Race—J. H. MacAlman (5½ horse power Locomobile steamer) winner; time, 7:56 3-5; L. R. Spear (20 horse power Winton), second; F. Tudor (15 horse power Winton), third. This was the most exciting race of the day, the big Winton

GEORGE CANNON AND HIS AUTO AT THE READVILLE TRACK RACES.

and the little Locomobile being practically even for the last 3 miles, the latter winning by about 15 yards.

Gasoline Cars Over 2,000 Pounds—Harry Fosdick (20 horse power Winton) winner; time, 7:42; J. L. Snow (20 horse power Peerless), second; George G. Reade (20 horse power Stearns), third. This race was the best big car race that has yet been seen in the vicinity of Boston. It was one continual brush from start to finish and Fosdick won only by a magnificent burst of speed, and crossed the tape 100 yards in the lead.

Pursuit Race—This was a race between a 20 horse power Winton, driven by Harry Fosdick, and a 15 horse power De Dion, driven by Kenneth A. Skinner. The two started from opposite sides of the track and kept on running until one passed the other. At first Skinner made a slight gain, but after the third mile Fosdick kept pulling up and at the ninth mile got abreast of Skinner, whom he passed at 9½ miles. The time at 9½ miles was 12:56 4-5. This event was one of the features of the meet.

New York Motor Cycle Hill Climbing Contest.

The first open hill climbing contest under the auspices of the New York Motor Cycle Club was held at Riverdale Hill, New York, Saturday morning, May 30, and was witnessed by quite a large crowd. There were in all thirty-four entries, but only twenty contestants.

The climb was up a measured half mile, having a maximum grade of 12 per cent., the average grade being 6 per cent. Joseph Oatman, president of the A. C. C. of New York, was referee and Mr. Moskowitz timekeeper. All along the route of the contest guards were stationed, and in more than one instance these prevented accidents.

The timing arrangements were excellent. An electric button was pressed at the start, and this rang a bell at the top of the hill at the finish.

The winner of the contest rode a 5 horse power "Hercules" machine, of which he is the maker, while the six who made the next best time rode "Indian" machines. Following are the results of the contest:

Rider.	H. P.	Machine.	Time. M.	Time. S.
G. H. Curtis, Hammondsport, N. Y.	5	Hercules.		51
F. P. Baker, Brooklyn	1¾	Indian.		55 2-5
Charles Gustafson, Springfield, Mass.	1¾	Indian.		58 1-5
Oscar Hedstrom, Springfield, Mass.	1¾	Indian.	1	1 1-5
F. W. Rogers, New York	1¾	Indian.	1	1 2-5
George B. Piper, Brooklyn	1¾	Indian.	1	2
George N. Holden, Springfield, Mass.	1¾	Indian.	1	5
James Farley, New York	2¼	Merkel.	1	6 2-5
George P. Jenkins, New York	3	Marsh.	1	7
George W. Sherman, New York	1¾	Indian.	1	8 3-5
J. White, New York	4	Orient.	1	9
C. G. Arnold, New York	4	Orient.	1	12 2-5
J. T. Brandenburg, New York	1¾	Thor.	1	14 2-5
F. A. Baker, Brooklyn	1¾	Indian.	1	16 2-5
J. M. O'Malley, Hartford, Conn.	2¼	Columbia.	1	18 1-5
N. P. Bernard, Hartford, Conn.	2¼	Columbia.	1	20
S. Gould, Brooklyn	1¾	Indian.	1	20
F. Thourot, New York	2	Clutch.	2	00 2-5
J. J. Rogers, New York	1¾	Indian.	2	14 2-5
J. Kline, New York	1¼	Singer.	2	15

J. Klein on One and One-quarter Horse Power Singer. Geo. B. Piper on One and Three-quarters Horse Power Indian.

G. H. Curtis, Winner. Scene at the Start.

VIEWS FROM THE MOTOR CYCLE HILL CLIMBING CONTEST.

Mr. Rogers might have made better time had he not stopped before the route had been completed. He was not familiar with the course, and when he met the first crowd of spectators on the hill he took them for the timers. Lewis R. Sniffen, New York, on a 3½ horse power Mitchell, and W. F. Wahrenberger, New York, on a 2¾ horse power Orient, stopped on the hill, and although they had several trials before they were disqualified, they never succeeded in reaching the top of the hill.

This was the first contest of its kind ever held in the section around New York, and its promoters feel very much gratified at its success. It was scheduled to begin at 10:30 o'clock a. m., but it was some little time after before the first machine started, and it was not until about 1:30 p. m. before the last man had gone up the hill.

Minneapolis Hill Climbing Contest.

The Minneapolis Automobile Club on Saturday, May 16, held a hill climbing contest on Kenwood Hill, Minneapolis. This hill, according to measurements specially made for the purpose of this contest by Frank H. Nutter, civil engineer, is 2,908 feet long (.551 mile), has a total rise of 97 feet and an average grade of 8.7 per cent. The steepest grade is 10.8 per cent., the steepest hill length 450 feet, and the total rise of this length 39 feet. The hill proved an ideal course for a test of this kind. It begins with a gentle slope, the gradient gradually increasing, and toward the end there are a number of turns in the course which test not only the machines but also the skill of the operators in cutting corners properly, changing clutches to maintain the highest engine power, etc.

The contest was preceded by a short run through the business district of the city at a good speed, which ought to have impressed the aldermen and members of the Park Board with the perfect control of an automobile in the hands of an expert. Fully 3,000 spectators were gathered near the top of the hill, where the finish could be seen and the crucial test witnessed.

The events were well managed, and once they were started they were carried out without delay. In fact, the machines puffed up the hill, one after the other, at times in such rapid succession that it was difficult for the checkers to keep track of them.

Following are the complete results in the various events:

CLASS NO. 1.

Contestant.	Time.
Dr. Koehler, Rambler	1:55 1-5
N. E. Brown, Cadillac	1:56
A. F. Pillsbury, Olds	2:08
E. J. Phelps, Olds	2:13
George P. Case, Cadillac	2:20
H. E. Pence, Cadillac	2:23 3-5
W. Y. Chute, Rambler	2:28 1-5
D. E. Andrews, Cadillac	2:30
L. B. Newell, Cadillac	2:32 1-5
L. Paulee, Olds	2:46

CLASS NO. 2.

Contestant.	Time.
A. W. Strong, Knox	1:58
E. J. Phelps, Knox	2:04
W. E. Wheeler, Knox	2:04 4-5
J. B. Stewart, St. Louis	2:19
Dr. W. A. Jones, Knox	2:25 1-5
George Doerr, Orient	2:27
Willis Walker, Stevens-Duryea	2:37 1-5
W. M. Adland, Union	2:50 3-5

CLASS NO. 3.

A. T. Rand, auto car	2:21

CLASS NO. 4.

H. E. Pence, Toledo	1:15 1-5
H. P. Watson, Winton	1:31 1-5
Alfred Pillsbury, Winton	1:33
George Christian, Winton	1:35 1-5
Charles Pillsbury, Winton	1:39
Asa Paine, Winton	1:53

Dr. Koehler, who scored the best time in Class 1, was disqualified, a protest being entered that the driver of this machine was not a member of the club. The prizes were awarded as follows:

CLASS 1.

First Prize—N. E. Brown, Cadillac; time, 1:56.

Second Prize—A. F. Pillsbury, Olds; time, 2:08.

CLASS 2.

First Prize—A. W. Strong, Knox; time, 1:58.

Second Prize—E. J. Phelps, Knox; time, 2:04.

Third Prize—W. E. Wheeler, Knox; time, 2:04 4-5.

CLASS 3.

First Prize—A. T. Rand, Auto car; time, 2:21.

CLASS 4.

First Prize—H. E. Pence, Toledo; time, 1:15 1-5.

Second Prize—H. P. Watson, Winton; time, 1:31 1-5.

Third Prize—Alfred Pillsbury, Winton; time, 1:33.

Accidents.

The plant of the defunct Milwaukee (Wis.) Automobile Works was destroyed by fire on May 19.

An automobile containing Cornelius Beck and Simeon Gaunt ran into the Columbus statue in Grand Circle, New York, on May 27. The men were thrown out, but were not seriously hurt. The front of the machine was smashed.

While racing at a speed of 40 miles an hour at the race track at Los Angeles, Cal., last week, C. A. Hawkins, Pacific Coast agent for the White Sewing Machine Company, was thrown from his automobile and severely shaken up. The steamer was badly damaged.

R. H. Palmer states in the *American Machinist* that in mixing irons for making castings for piston packing or rings it is well to keep in mind that a hard packing will cut a cylinder. Hence a soft iron is necessary. Also, graphite is a lubricator; so a soft iron rich in graphitic carbon is preferred.

MINOR MENTION

We have received a photo from Silas Thurston, Sunbury, Pa., showing a three wheeled, light gasoline car he built for his own use.

W. D. Wilmot has opened an automobile repair station on Rock street, Fall River, Mass. He has the local agency for the Cadillac.

E. H. Moulton, Jr., has opened a garage at 316 and 318 Fourth avenue, South, Minneapolis, Minn., and will handle the Peerless and Cleveland automobiles.

The formal transfer of the property of the International Motor Car Company, of Toledo, Ohio, to the Pope Motor Car Company took place on May 27.

The Bedford Automobile Garage will be opened at 1060 Bedford avenue, Brooklyn, on June 1, under the management of Mr. Hosbech, now at South Fifth street, near Union avenue.

The Knoxville Automobile Company is the name selected for the new company which proposes to operate a line of auto buses between Knoxville and Fountain City, Tenn, and the capital stock has been increased to $50,000.

The Automobile Supply Department of the National Electric Supply Company, Washington, D. C., sends out a little booklet containing the police regulations governing the operation of automobiles in the District of Columbia.

The Lewis Automobile Company, reported last week as having been incorporated, have opened a garage at 221 East Fifty-ninth street, New York. The officers are: President, L. M. Bloomingdale, and secretary and treasurer, Charles D. Clark.

The Hall Gasoline Engine Company, of Wollaston, Mass., are building a six cylinder gasoline engine to run at 1,000 revolutions per minute. It is rated at 20 horse power, and weighs 350 pounds. The dimensions are 15¼ inches in diameter and 32 inches in length.

A plan is reported to be on foot to remove the plant of the Packard Motor Car Company from Warren, Ohio, to Detroit, Mich. The plan contemplates a capitalization of $400,000, the erection of 5 acres of buildings on a 10 acre plot and the employment of 600 men.

The American Darracq Automobile Company, of New York, are out with a statement to the effect that in *Munsey's Magazine* for May there appeared a cut of a Winton car in connection with the words: "Percy Owen and his gasoline racing car, weighing 1,950 pounds, with which he did 5 miles in 6 minutes and 42 seconds at Brighton Beach on August 23 last," and that "the fact of the matter is that Mr. F. A. La Roche in a light Darracq car, weighing 1,600 pounds, made this time,

and Mr. Owen was so far behind that his time was not taken."

The Shepard Cycle Company, 53 Clinton street, Chicago, Ill., are building an electric carriage.

The Sexton Can Company, 2 Hartford street, Boston, Mass., are putting a new oil can on the market.

Drisko & Snow, 43 Columbus avenue, Boston, have dissolved partnership. Roswell Drisko continues.

The Standard Welding Company, Cleveland, Ohio, will soon be ready to supply pressed steel frames for automobiles.

The Park Square Auto Station, Boston, Mass., is being overhauled and enlarged to occupy the entire freight shed, a space 600x200 feet.

J. C. Brandes, United States agent of the Cudell Motor Company, Aix-La-Chapelle, Germany, has also taken the agency for the gasoline trucks of the Neue Automobil Gesellschaft, Berlin, Germany, described in our last issue.

The United States exports of automobiles and parts for April amounted in value to $134,680, compared to $151,199 in April, 1902. The value of automobile exports for the first four months of the year was $894,521, compared to $668,731 during the same period last year.

The American Motor Carriage Company, Cleveland, Ohio, has been placed in the hands of a receiver. The vice president, F. D. Dorman, states that the embarrassment is temporary only, the assets being sufficient to pay all obligations in full. The Prudential Trust Company, of Cleveland, is named as the receiver.

George H. Day, agent for the Association of Licensed Automobile Manufacturers, stated last week that the association had recently issued to several manufacturers limited licenses, allowing them to finish work now in hand. These licenses will expire on December 31 next, at which time the makers will retire from business. The Elmore Manufacturing Company and the St. Louis Motor Carriage Company have been admitted to membership.

The I. S. Van Loan Company, dealers in second hand electrical machinery, at 465 Greenwich street, New York city, have entered the automobile field as dealers in and repairers of all types of automobiles. In connection with the new branch of their business they will maintain a repair and storage station somewhere in Harlem, probably on 125th street. It is understood that Henry Welsh, a capitalist, of New Rochelle, is the backer.

The Winton Motor Carriage Company, Cleveland, Ohio, are turning out thirty-five touring cars a week, and by August 1 will have shipped 800 of this year's models. They are laying plans to largely increase their output next year. They have purchased property adjoining, whereon they are erecting a body shop and power house, and are putting up at the other end of their present plant two shops, together equal in size to the present plant. They have recently advanced the wages of all their employees 10 per cent.

The Buckmobile Company, of Utica, N. Y., are about to erect a larger plant.

The organization of a company to run a line of automobiles at Grand Rapids, Mich., is under way.

The Board of Trade of Lancaster, Pa., is negotiating for the establishment of an automobile factory there.

Kiser & Co., Dayton, Ohio, are manufacturers' agents for the "Averylite" auto lamp, invented by Percy C. Avery.

The Rome Locomotive Works, after building seven C., G. & V. machines, have discontinued their manufacture.

The Muncie Wheel and Jobbing Company, Muncie, Ind., are going extensively into the manufacture of auto wheels.

A department store, said to be Hayden Brothers, Omaha, Neb., will supplant their teams with automobile delivery wagons.

It is reported that the Peerless Motor Car Company, of Cleveland, Ohio, will erect a new plant in Canton if a suitable site can be secured.

The Salem (Mass.) Electric Lighting Company states that it is prepared at any hour, day or night, to charge automatic batteries at its station, 21 Peabody street.

At a meeting of the Board of Trade of Binghamton, N. Y., on May 18, it was reported that progress was being made in securing the location of an automobile plant in that city.

The Oakes & Morse Company, of Boston, Mass., write that they have applied for a patent on a spark plug with a new insulation and that they are now ready to put it on the market.

H. A. Knox will take one of his new two cylinder 16 horse power cars to Europe this summer in order to show the French manufacturers something new in air cooled motor design.

In the article on the Harkness racing machine in a recent issue it was stated that the motor was designed by E. T. Birdsall. This was an error. It was designed by Mr. Frederick, of the Standard Automobile Company.

Last week the statement was made in these columns that the Waltham Manufacturing Company, of Waltham, Mass., had reduced the price of their motor buckboard to $350. This is erroneous. The price should have been $375.

The Remington Automobile Company, Utica, N. Y., has been reorganized with W. H. Owen, formerly of the Willoughby-Owen Company, as manager, under the name of the Remington Motor Vehicle Company. Ten machines are under way.

The program for the motor cycle races at the Fair Grounds track, Indianapolis, Ind., on May 30, comprised four events—a 3, 1 and 5 mile handicap, and also a 1 mile handicap for winners of first and second places in the three first named events. Winners of the first and second places in each event were given gold medals as prizes.

A company is being formed at Columbus, Ohio, to manufacture automobiles.

The adoption of automobiles by the Board of Public Safety of Columbus, Ohio, is being discussed.

Andrew A. Halsey, secretary and treasurer of the De Dion-Bouton Company, died at his home in Brooklyn, N. Y., on May 19.

Adolph Geisel, of Springfield, Mass., has devised a combination basket and ice box for carrying things on the side of automobiles.

Because automobiles are increasing so rapidly at Atlantic City, N. J., several hotel proprietors are having constructed special buildings for storing them.

At the annual meeting of the Consolidated Rubber Tire Company at Jersey City, N. J., Van H. Cartmell was re-elected president and Frederick W. Seaman secretary and treasurer.

The Syracuse (N. Y.) Automobile Company has passed into the management of R. M. Cornwell. The company is located at 346 South Warren street and is agent for the Olds and Winton machines.

An automobile race was the feature of the annual events on the Santa Mesa track at Manila, P. I., on April 17. The contestants were Santiago Ortega and Senor Veloso, but the race is said to have been very tame, the latter's machine broke down twice and the former finished nearly three-quarters of a mile ahead.

Russell & Erwin Company and the American Hardware Corporation have purchased the Bristol Motor Car Company, of Bristol, Conn., and it is said a new company will be formed with a capital stock of $200,000 and the following named officers: Philip Corbin, president; Howard S. Hart, general manager, and James H. Jones, general manager of the construction department.

The Waldorf Motor Car Company, which has just been incorporated with a capital of $10,000, is preparing to open an automobile salesroom and garage at No. 1 West Thirty-fourth street, opposite the Waldorf-Astoria Hotel. Facilities for charging electrics and for repairing all types of machines will be provided. Storage charges will range from $5 a month for idle machines to $15 for those in regular use. The officers are: George L. Haley, Jr., president; George C. Peckham, vice president, and John E. Stannard, secretary.

The recently organized Gibbs Engineering and Manufacturing Company has secured two large floors at 217 and 219 East Forty-second street, New York city, and is preparing to engage on a large scale in the manufacture of automobiles. An extensive machine shop equipment is already in place, and an office and drafting room force has been secured. While the details of this company's plans have not yet been

made public, it is understood that heavy commercial vehicles will constitute its principal output. Lucius T. Gibbs, formerly vice president and general manager of the Vehicle Equipment Company, is president, S. H. P. Pell vice president, C. A. Kittle treasurer, and H. Pell-Haggerty secretary.

The Philadelphia branch of Banker Brothers Company reports the following sales of automobiles for the week ending May 23: One Peerless car to P. R. Theobald, of Philadelphia; Autocars to G. H. MacNeely, of Philadelphia; J. H. Marvil, of Laurel, Del.; Wilson Potter, of Chestnut Hill, Pa., and Jay Cook, 3d, of Philadelphia; one Knox to Albert Lucas, of Gibbsboro, N. J., and one Northern to J. D. Shattuck, of Chester, Pa.

Los Angeles Races.

The races at the race track in Los Angeles, Cal., resulted as follows:

Five Mile Motor Cycle, Handicap—F. G. Lacey won; time, 6:30; R. C. Hamlin, second; H. Kranz, third, and A. Hoxie, fourth.

Five Miles for Oldsmobiles—Skinner won; time, 11:37; Lacey, second; Collinge, third, and Mills, fourth.

Five Miles for Steam Automobiles—Walter Grothe won; time, 8:52; C. A. Hawkins, second.

Five Miles for Gasoline Machines Under 1,500 Pounds—Entries, W. T. Hansen, with an Autocar, and F. E. Hughes, with an Oldsmobile; no winner announced, as Hughes claimed that he was prevented from winning by the jockeying of Hansen, who was in the lead in the stretch of the final mile. Time, 13:32½.

Five Mile Automobile, Handicap—Walter Grothe (White) won; W. T. Hansen (Autocar), second, and Collinge (Oldsmobile), third. Hawkins (White) was thrown out of his machine in the first half mile and incapacitated.

Hill climbing exhibitions were also given by the Waverley Electric and Oldsmobile gasoline machines.

In an address before the New York Electrical Society upon "The Steam Turbine," Dr. R. H. Thurston said, in part:

"The trend of progress and the promise for the immediate future is in the direction of further gain in economy of the machine by suppression of leakage and of friction of fluid within its casing by improved workmanship, and by securing a better working substance by freeing it from water and also by utilizing the process of superheating to increase the thermodynamic range. This means, however, improvement at the boiler rather than at the engine.

"The trend is also toward the application of specially designed and constructed turbines to special uses. It is probable that, gradually, forms will be adapted particularly to use in electric light and power plants; others as marine engines, and still others to other work."

LEGISLATIVE AND LEGAL.

The city solicitor of Shelby, Ohio, has been instructed to draft an ordinance limiting the speed of automobiles to 8 miles an hour.

The first arrest under the new Minnesota automobile law was made at St. Paul on May 22. The victim was Herbert Lytle, of Toledo, Ohio, who is on an auto trip through the West.

The case of William W. Davy, of Syracuse, N. Y., who sued George M. Barnes for $1,000 damages for injuries caused by defendant's automobile, has been settled, Mr. Barnes agreeing to pay the doctor's bill and the costs of the action.

The first arrest under the New Jersey automobile law occurred at East Orange on May 16, when an automobilist was taken into custody for running an auto without having his license number attached to it. He was fined $15.

An ordinance has been passed by the Village Board of Fort Plain, N. Y., limiting the speed of automobiles to 8 miles an hour within one-half mile of the post office, under a penalty of a fine of not less than $25 nor more than $50 for each offense.

At a meeting on May 23 of the board of governors of the Madison Park and Pleasure Drive Association, of Madison, Wis., a resolution was adopted forbidding automobilists and motor bicyclists to use for the rest of the current year the drives of the system which it controls.

The $10,000 suit of John Hurley, of Mount Vernon, N. Y., against A. St. John Wood, of New York city, for injuries sustained on account of being run down by defendant's automobile a few weeks ago, has been settled out of court by the payment of $1,000 to Hurley.

Decision has been given in favor of Dr. Alexander Nettleroth, of Louisville, Ky., who was sued by C. L. Riddle for $90 for damages claimed to have been sustained by being run into by defendant's automobile. The judge held that Dr. Nettleroth had done all he could to avert the accident.

Michael Feeley was injured and Daniel F. Crowley was killed in Boston, Mass., on May 19 by being thrown from a wagon, the horse having been frightened by the automobile horn of W. A. Fuller and Victor Pager. The automobilists were arrested on a charge of manslaughter.

It appears that the reason for the new regulation regarding the entry of automobiles into Canada is due to the fact that some automobiles taken into the country ostensibly by tourists have been sold there without any duty having been paid on them, but it is expected that new regulations will be issued allowing bona fide tourists to enter their machines on payment of a deposit equivalent to the duty, which deposit will be returned to them when they leave the country.

The assistant city attorney of Milwaukee, Wis., has decided that the new ordinance does not include the horn as a means of sounding a warning, as it provides for an "alarm bell or gong" only. He holds that horns are not sufficient, and the police have been instructed to enforce the ordinance as it stands.

The automobile regulations of the District of Columbia go into effect on June 7, and E. F. Vermillion, Henry Boesch, Daniel Johnson, Walter C. Allen, W. A. McFarland and Charles E. Foster have been appointed by the District Commissioners as a board to consider applications for permits to operate automobiles. Mr. Vermillion has been designated as chairman. All automobiles must be registered within thirty days after the law becomes operative.

A number of automobilists of Washington, D. C., have formed the National Capital Automobilist Association, to contest in the courts the legality of the police regulations in regard to the numbering of machines. A fund of $600 has been subscribed for the purpose. At a meeting of the organization on May 20 a committee was appointed to retain attorneys and make all necessary preparations to carry the question to the Supreme Court of the United States, and resolutions condemning the proposed resolutions and that they will be opposed in the courts were unanimously adopted. Among those present were Wm. B. French, A. M. Keen, Albert B. Dulin, Hugh Wallis, Chris. J. Gockeler, P. J. Lockwood, C. E. Doyle, S. S. Olds, Jr., W. J. Foss, W. M. Sprigg, DeWitt C. Chadwick, Edgar P. Copeland, J. W. Boyd, F. DeB. Weston, E. M. Hasbrouck, Horace A. Dodge, E. M. Sunderland, W. E. Spire, L. A. Hill and J. C. Suter.

On May 11 Mayor Bookwalter, of Indianapolis, Ind., approved the ordinance regulating automobiles on the city streets. It limits the speed to 8 miles an hour within and 12 miles without the territory bounded by North, East South and West streets; provides for initials of owners in white or aluminum not less than 3 inches high, but this is not applicable to nonresidents who remain in the city not longer than five days, alarm bells or horns, and also for lighted lamps from one-half hour after sunset to one-half hour before sunrise. The penalties are a fine of not less than $5 nor more than $50.

The pending Oshkosh, Wis., automobile ordinance has been amended to increase the speed limit from 6 to 8 miles an hour on the highways, except at crossings and bridges, where it is placed at 4 miles. It also requires that automobiles be equipped with brakes of sufficient power to bring machines to a full stop within 10 feet, with a bell or gong or other suitable alarm device, and that white lights in front and

red lights in rear be displayed after dark and before dawn. Registration is also required, and penalties of a fine of from $5 to $35 or imprisonment in the county jail not to exceed sixty days or both fine and imprisonment are imposed.

The Kokomo (Ind.) City Council has raised the speed limit of automobiles outside of the fire limits from 8 to 15 miles an hour.

A regulation has been issued by the Board of Selectmen of Meredith, N. H., limiting the speed of automobiles through the town to 5 miles an hour.

The Oshkosh, Wis., ordinance regulating automobiles was presented at the last meeting of the city council, read the first time, ordered published and laid over under the rules.

The Advance Manufacturing Company, of Hamilton, Ohio, manufacturer of automobile engines, was on May 26 placed in the hands of Charles E. Heiser as receiver, on the application of George P. Shongen.

May 29 has been appointed for the trial at East Williston, L. I., of Charles Bartel, chauffeur of August Belmont, of New York, who was arrested last week on a charge of violation of the automobile speed law.

Owing to the failure of the authorities in most parts of Nassau County to provide the signs called for by the Bailey-Doughty law, automobilists are reputed to be speeding their machines faster than ever, and officers are powerless to interfere in the absence of signs. Justice Oakley says it would be useless to make arrests under such circumstances, as convictions would not be upheld in the higher courts. Signs, however, have been put up at the Hempstead village limits.

Chief of Police Tarbox and a squad of five patrolmen in plain clothes made a raid on automobilists in Newton, Mass., last week. They stationed themselves at the corner of Cedar street, where a stretch of an eighth of a mile had been measured off, and as each machine went by the chief noted the speed, and if it exceeded the limit the men at the other end of the measured space held it up, while the name and address of the driver were taken. The result was that twenty-eight automobilists were marked for court proceedings.

Mayor Harrison, of Chicago, Ill., is reported as having said that he will sign the automobile numbering ordinance, and possibly submit an amendment which, he believes, will overcome the objection that operators of machines, when they get into trouble, may pull in the numbers and thus avoid identification. The mayor believes that if provision is made that a second offense shall result in immediate revocation of the offender's license this contingency can be avoided. President Foreman, of the South Park board, said that that body would revise its automobile numbering law to conform with the measure enacted by the city council.

The Committee on Ways and Means reported to the Massachusetts Legislature on May 29 a new draft of the bill to regulate the speed and licensing of automobiles. The license fee for operators is lowered from $3 to $2 a year, and all must be licensed by August 1, 1903. Automobiles registered in other States may be operated in Massachusetts subject to such rules as the State Highway Commission may make. The maximum speed of vehicles is placed at 15 miles an hour in the country and 10 miles an hour within the city limits.

THE FIRST HOLD-UP UNDER THE NEW AUTO LAW SIGNED BY GOVERNOR ODELL.
BY A. P. YATES, SYRACUSE, N. Y.

MOTOR VEHICLE PATENTS..

United States Patents.

727,770. Vertical Steam Generator.—Emile Establie, of Paris, France. The object of these improvements is to provide in fire tube steam generators means for thoroughly cleaning the walls of the fire box by preventing the mud contained in the water from leaving deposits on said walls.

The improvements consist in surrounding the boiler tubes by jacket tubes, which extend upward beyond the highest water level, which rest by their lower edge on the top of the fire box, and which are provided at their lower end with very thin slots extending through the whole thickness and to a small height of the tubes. The boiler is supplied with a water injection tangential to the cylindrical fire box and leading to the annular portion between the fire box and the outer wall of the boiler. By the combination of these two arrangements the thorough cleaning of the walls of the fire box is assured. In fact, the water can only enter the space provided between the boiler tubes and their jackets by passing through the thin slots of the jackets, which slots, besides, stop the mud. The small quantity of water which passes thus by the slots of each jacket is vaporized instantaneously as it arrives in contact with the boiler tube, which is continuously kept at a very high temperature. This sudden vaporization acts like a small explosion and increases during a very short time the pressure at the base of the jacket tube, which pressure produces steam jets from inside the tube to outside through the slots of the tube and assures thus a horizontal chase, which forces laterally the mud which has not been free to pass through these slots and prevents it from being deposited at the top of the fire box. This mud falls into the annular portion of the boiler which surrounds the fire box and is carried away by the continuous rotary motion of the water produced in this portion by the tangential supply of water.

727,726. Speed Changing Gear.—Paul H. White, of Indianapolis, Ind. May 12, 1903. Filed August 22, 1902.

A two change speed gear for steam trucks. To the driving shaft 5 are secured two gear wheels, 6 and 7, the latter being smaller than the gear 6. Pivoted upon shaft 5 is a frame 8, which carries on one side of shaft 5 a stud shaft 9. Upon the latter is journaled a pinion 10, meshing with gear 7 and adapted to be thrown into mesh with a driven gear 11, carried by the driven shaft 12. Frame 8 also carries a second stud shaft 13, upon which is journaled a pinion 14, meshing with the gear 6, said pinion being of sufficient length to extend from the plane of gear 6 to the plane of gear 11, and its arrangement being such that by swinging frame 8 upon shaft 5 pinion 14

may be thrown into and out of mesh with gear 11. Pivoted upon shaft 12 is a cam 15, which fits within and controls frame 8, the cam being swung upon its centre by means of a suitable arm 16 and link 17 pivoted thereto.

727,944. Controlling Mechanism for Internal Combustion Engines.—C. O. Hedstrom, of Portland, Conn. May 12, 1903. Filed October 28, 1901.

The speed of a bicycle motor is reduced by a spark timer. When the latter reaches the limit of its motion it locks the exhaust valve in the open position.

727,752. Steam Engine.—Charles Crompton, of Worcester, Mass. May 12, 1903. Filed September 25, 1901.

728,140. Liquid Fuel Burner.—C. W. Spicer, of Ithaca, N. Y. May 12, 1903. Filed July 22, 1902.

728,202. Storage Battery.—Alfred W. Charlton, Toronto, Canada. May 19, 1903. Filed October 6, 1902.

728,284. Steam Boiler.—Charles Olson, Grand Rapids, Mich. May 19, 1903. Filed September 19, 1902.

728,430. Heating System for Motor Vehicles.—William O. Worth, Chicago, Ill., and William R. Donaldson, Louisville, Ky. May 19, 1903. Filed March 15, 1902.

728,490. Rubber Tired Wheel.—Richard Mulholland, Dunkirk, N. Y. May 19, 1903. Filed August 11, 1902.

728,499. Motor Vehicle.—John C. Reuter, St. Louis, Mo. May 19, 1903. Filed July 3, 1902.

728,548. Steam Boiler.—Charles Cretors, Chicago, Ill. May 19, 1903. Filed August 28, 1902.

728,747. Electric Igniter for Hydrocarbon Engines.—Harry M. McCall, Pittsburg, Pa. May 19, 1903. Filed February 27, 1902.

728,748. Governor.—Harry M. McCall, Pittsburg, Pa. May 19, 1903. Filed June 26, 1902.

728,840. Steam Boiler for Locomobiles or Other Machines.—William N. Best, Los Angeles, Cal. May 26, 1903. Filed July 2, 1901.

728,873. Oil Engine.—John S. Cundall, Robert D. Cundall, William D. Cundall and Henry C. Cundall, Baildon, England. May 26, 1903. Filed June 16, 1902.

728,950. Sparking Igniter for Explosive Engines.—Alonzo C. Mather, Chicago, Ill. May 26, 1903. Filed September 26, 1900.

729,010. Vehicle Driving Mechanism.—Paul Synnestvedt, Glenview, Ill. May 26, 1903. Filed October 15, 1900.

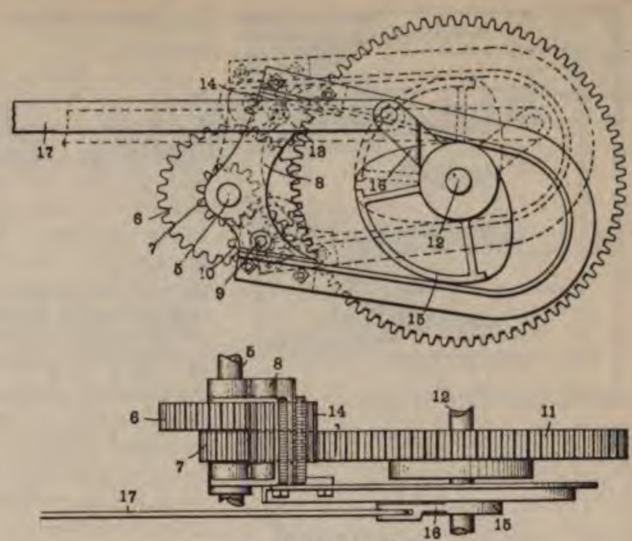
729,031. Vehicle Running Gear.—Harold B. Atkins, New York, N. Y. May 26, 1903. Filed August 21, 1899.

729,100. Separator for Storage Batteries.—Elmer A. Sperry, Cleveland, Ohio. May 26, 1903. Filed November 25, 1901.

729,107. Steam Engine.—William Sutcliffe, Paterson, N. J. May 26, 1903. Filed August 2, 1902.

729,140. Storage Battery.—Robert Darling, Rye, N. Y. May 26, 1903. Filed December 26, 1901.

No. 727,770.



No. 727,726.

729,194. Gas Engine.—John MacHaffie, Schenectady, N. Y. May 26, 1903. Filed August 12, 1901.

729,197. Motor Cycle Gear.—Eugéne Mathieu, Louvain, Belgium. May 26, 1903. Filed April 16, 1902.

729,254. Carbureting Device for Explosive Engines.—Madison F. Bates, Lansing, Mich. May 26, 1903. Filed May 4, 1901.

729,311. Compressible Tire for Vehicles. —Henry P. Feister, Philadelphia, Pa. May 26, 1903. Filed June 25, 1902.

729,377. Combined Governor and Gas and Air Mixer for Explosive Engines.—William F. Meister and Winfield S. Pattin, Marietta, Ohio. May 26, 1903. Filed September 30, 1902.

729,385. Vehicle Wheel.—William Morrison, Chicago, Ill. May 26, 1903. Filed January 8, 1900.

729,467. Explosion Engine.—John C. White, Decatur, Ill. May 26, 1903. Filed March 26, 1902.

729,499. Igniter for Gas Engines.—John MacHaffie, Schenectady, N. Y. May 26, 1903. Filed October 3, 1902.

729,501. Variable Speed and Reversing Gear.—Rodolphe Mathot, Brussels, Belgium. May 26, 1903. Filed June 16, 1902.

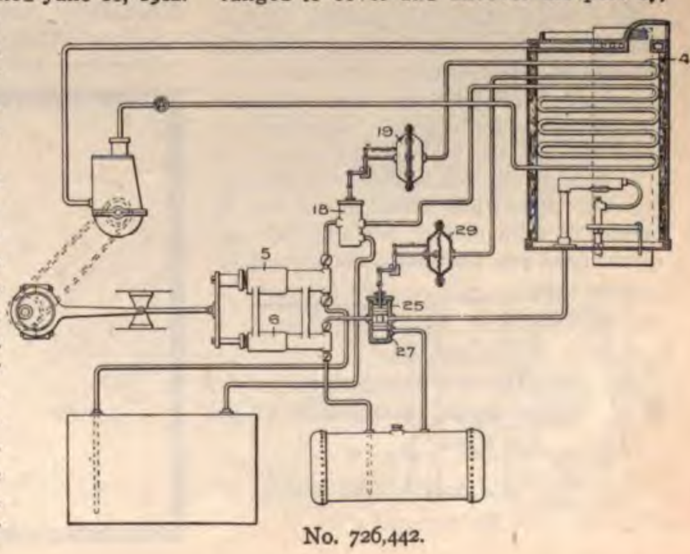
726,442. Flash Boiler System.—Alexander F. Macdonald, of Schenectady, N. Y. April 28, 1903. Filed February 19, 1903

Fuel and water pumps are provided whose deliveries bear a certain relation to each other at all times, whereby the proper amount of heat is furnished to convert a given amount of water or other liquid into vapor at a given temperature. In order to regulate the deliveries of the pumps in accordance with the demand for vapor energy, a bypass valve or regulator is provided for each pump, which regulators are simultaneously manipulated either by hand or automatically in accordance with the demand for vapor energy. It has been proposed to provide a pump with a spring controllled bypass valve, but this is open to the objection that the pump must work against the same pressure, whether actually feeding or not.

In the drawing 4 represents a vapor tension thermostat containing kerosene. Water is fed to the boiler by pump 5 and fuel to the burner by pump 6. The two pump pistons are rigidly connected together and are operated by an eccentric from the engine. In circuit with the delivery pipe of the water pump is a bypass regulator, which is acted upon by the diaphragm 19, the latter being connected to the vapor tension thermostat.

The load on the pump is decreased as soon as the bypass valve is opened, which is one of the distinguishing features of the invention.

In circuit with the pipe which conveys fuel to the burner is a bypass regulator 25, which comprises a balanced piston arranged to cover and uncover the port 27,



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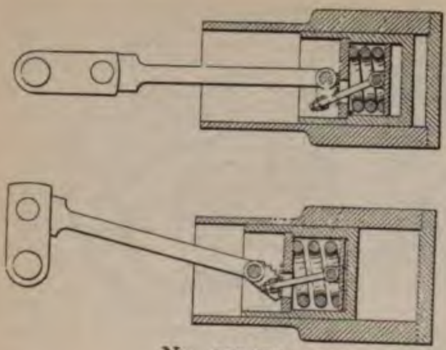


No. 727,777.

in communication with the tank. In order to actuate the piston valve a diaphragm regulator is provided, which is acted upon by the pressure in the vapor tension thermostat. The valve stem is connected by a link to bell crank levers, and the latter is urged in one direction by a diaphragm and in the opposite direction by a spring. When the piston valve is in the position shown, all the fuel delivered by the pump will pass into the burner. When the pressure on the diaphragm increases the piston valve is forced downward and more or less of the fuel will be bypassed through the port 27 to the tank, the balance going to the burner, as before. It is desirable to make the port 27 relatively long and narrow, so that considerable movement of the piston valve is required to bypass all or substantially all of the fuel from the pump.

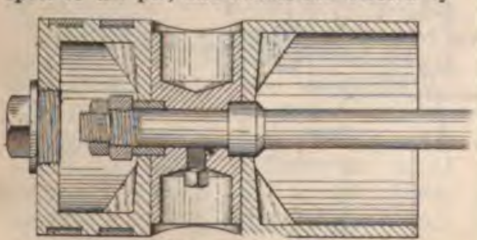
It is evident that when the temperature of the fire gases increases abnormally the pressure created within the vapor tension thermostat will be exerted on the diaphragms 19 and 29 in a manner to cause the pistons to be forced downward, and thus permit a certain amount of fuel and water to be bypassed to the supply tanks.

726,468. Process of Forming Accumulator Electrode.—G. J. Scott, of Philadelphia, Pa. April 28, 1903. Filed February 28, 1903.

724,328. Mixing Valve for Explosion Engines.—Maurice Pivert, New Orleans, La. March 31, 1903. Filed June 5, 1902.

727,937. Piston.—Charles L. Haase, Jr., of Milwaukee, Wis. May 12, 1903. Filed May 23, 1902.

In a trunk piston for gasoline engines having a hollow pin channel extending through the same from side to side a pin is provided of relatively large diameter located within the channel. Openings are made through the walls of the channel to accommodate the oscillations of a connecting rod. Means are carried by the rod to prevent it from moving laterally with respect to the pin, and means are carried by the pin to prevent the rod from rotating within it.



No. 727,937.

727,777. Explosion Engine.—Lucien M. Foster, of Boston, Mass. May 12, 1903. Filed September 12, 1900.

Relates to a four cycle explosion engine and has for its object to provide means whereby a variable stroke of the reciprocating member or piston is obtained for the purpose in a four cycle engine of clearing the cylinder at every other stroke by causing the piston to move wholly to the end of the cylinder and at alternate strokes to provide a space for the charge by causing the piston to stop before it reaches the end of the cylinder. This is accomplished in accordance with the present invention by interposing between the piston and its connecting rod or pitman a yielding connecting device, as shown in the drawing. The normal position of the pitman and piston is such that the piston during the instroke will travel substantially to the end of the cylinder, this being the condition during the exhaust stroke of the engine. During the alternate strokes, however, when a charge has been admitted to the cylinder the resistance of the charge under compression acting upon the yielding connecting device will arrest the piston before it reaches the inner end of the cylinder, thus leaving a space or explosion chamber which is occupied by the compressed charge.

724,379. Motor for Automobiles, Etc.—Charles S. Cole and William J. Baulieu, Bridgeport, Conn. March 31, 1903. Filed February 17, 1900.

723,975. Steering Mechanism for Vehicles.—Augustus A. Ball, Jr., Lynn, Mass. March 31, 1903. Filed January 24, 1902.

723,976. Steering Mechanism for Vehicles.—Augustus A. Ball, Jr., Lynn, Mass. March 31, 1903. Filed April 17, 1902.

724,157. Tire Detacher.—Alva W. Blanchard, New York, N. Y. March 31, 1903. Filed August 20, 1902.

724,254. Steam Trap.—Joseph G. Branch, St. Louis, Mo. March 31, 1903. Filed May 12, 1902.

724,380. Motor for Automobiles, Etc.—Charles S. Cole and William J. Baulieu, Bridgeport, Conn. March 31, 1903. Filed February 17, 1900.

724,393. Compensating Gear.—Thomas J. Lindsay, Indianapolis, Ind. March 31, 1903. Filed May 23, 1902.

722,206. Steam Engine.—Byron J. Carter, of Jackson, Mich. March 10, 1903. Filed January 18, 1902.

722,223. Gas or Gasoline Engine.—Bernt Garllus, Madison, Wis. March 10, 1903. Filed December 7, 1901.

722,224. Automobile.—Leonard B. Gaylor, Newton Centre, Mass. March 10, 1903. Filed December 6, 1902.

722,671. Gas Engine.—Leopold F. Burger, Anderson, Ind. March 17, 1903. Filed October 21, 1901.

722,672. Valve for Gas Engines.—Leopold F. Burger, Anderson, Ind. March 17, 1903. Filed November 11, 1901.

New Incorporations.

The capital stock of the Buckmobile Company of Utica, N. Y., has been increased from $12,000 to $50,000.

Central Motor Car Company, Indianapolis, Ind., to make automobiles and manufacture the Stutz gasoline motor; organizers, Stutz, Hardin & Spratt.

Bode Automobile Company, Chicago, Ill., to make automobiles. Capital, $50,000. Incorporators, Leon S. Alschuler, James G. Condon and Charles W. Stiefel.

C. A. Duerr & Co., of New York, to deal in automobiles; capital, $5,000; incorporators, Chas. A. Duerr, Irving L. Atwood and Raymond H. Weaver, all of New York city.

Automobile Maintenance Company, of Chicago, Ill., to manufacture, repair and deal in automobiles. Capital, $2,500. Incorporators, Gail Dray, Herbert R. Lloyd, George C. Madison.

The New York and Jersey Automobile Company, of New York; capital stock, $20,000; incorporators, Myron H. Oppenheim, of Elberon, N. J.; Maurice Bamberger, Benjamin Wolf, Walter Content and George Toplitz, of New York.

The Chauffeurs' Association of America, with headquarters in New York city; to promote and elevate the profession of chauffeurs of gas engines exclusively; directors for the first year, Van Allen Soule, Charles E. Neale, Hiram H. Hill, Samuel Brock and Frederic W. Welch.

THE HORSELESS AGE

...EVERY WEDNESDAY...

Devoted to Motor Interests

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The Effects of the Bailey Law.

In a communication appearing in this issue a manufacturer expresses the view that the Bailey law will deter people from buying automobiles, offering in substantiation of this view a letter from a prospective customer who claims to have been led to forego buying by the passage of the law.

It is quite possible that a few prospective buyers have decided to wait or to give up the idea of owning an automobile entirely, but it is more likely that these were influenced by the pessimistic views of the new law which found expression in some publications rather than by a careful consideration of the provisions of the law itself. Such statements as "the bill if it becomes a law is sure to kill automobiling in this State," or "with this law in force automobiling will be a practical impossibility," are not calculated to reassure the prospective owner who is not aware of the utter hollowness of these phrases.

In reality there is no reason why anyone who intended to buy an automobile before the passage of the Bailey bill should not do so now. The new law does not reduce the speed limit—on the contrary it has raised the minimum from 8 to 15 miles an hour in outlying city districts where the houses are more than 100 feet apart, while it leaves the minimum the same for built up portions. Much will depend upon the administration of the law, and this in turn will depend largely upon the conduct of automobilists as a body. Those who use consideration in driving are no more likely to come in conflict with the law now than formerly.

The provision of the law which is most objected to is that prohibiting passing domestic animals upon the road at a rate of speed greater than 8 miles an hour, and requiring automobilists to stop if the person in charge of the animal raises his hand. This provision, of course, might be used by horse drivers to harass automobilists, but fortunately it will not be nearly as bad in practice as it seems upon *a priori* consideration. In the first place very few horsemen know the law, and of the few that do certainly only a small percentage will be of the kind that delight in annoying their fellow men. The ridiculous charge that automobilists would be compelled to slow down for every cat and dog they might meet upon the road can have no claim to consideration. The law was obviously not intended to work any such hardship, and will not be enforced in that sense. That automobilists must stop upon the signal of a horse driver is a just provision, in so far as it applies to cases where there is any danger of accident from horses taking fright. Even where no such law exists horse drivers would be granted the right to demand that automobilists stop if their horses are becoming uncontrollable. The majority of automobilists are only too glad to comply, preferring to inconvenience themselves a little rather than run the risk of causing an accident to others.

The National Association of Automobile Manufacturers has issued a very sensible and temperable circular on the Bailey law, announcing the intention of testing its constitutionality. It would be most desirable if some of the more objectionable clauses could be annihilated in this manner. But to secure really liberal legislation it will be necessary for all automobile interests to combine and inaugurate an energetic campaign for the purpose of stamping out the scorcher. One of the greatest weaknesses of the Bailey law is that it does not establish any speed limits for the open country, but leaves this matter for local authorities to regulate. As a consequence at present anybody can go at any speed he likes upon the highways of the State, and no doubt a great deal of

needless friction will be caused by scorchers before all local authorities pass speed ordinances. It must have been rather irritating to those working in the cause of liberal speed legislation to read last week of a prominent official of the A. C. A. "tearing along at the rate of a mile a minute" (to quote one of the numerous newspaper reports) and establishing a new record between Morris Park and Albany. Perhaps no law was broken, and perhaps there is no occasion for disciplining by the club; but if it was and the reports are correct the Bailey law certainly has one fault which has so far been entirely overlooked.

At any rate it is desirable that the law should be thoroughly dissected and criticised before the courts in order that its weak points may be shown more clearly and its defects be more easily remedied.

New York-Pittsburg Endurance Run.

The N. A. A. M. after its meeting last week announced that it had decided to hold a non-stop endurance contest from New York city to Pittsburg next fall, going by way of Philadelphia, Baltimore, and perhaps Washington, D. C. The distance of over 500 miles is to be covered in days, and the endurance contest proper is to be followed at Pittsburg by hill climbing and brake tests, a competition of style and appearance, etc. Although no details have yet been decided upon, it was announced that the intention was to make awards upon a basis of marks earned in fuel economy and other secondary competitions as well as in the endurance run proper.

It thus appears that the N. A. A. M. does not desire the Automobile Club of America to conduct the leading automobile events any longer. If the run to Pittsburg is held it is inconceivable that another successful contest could be held to Montreal and back the same season.

As long as the full conditions of the contest are not published little can be said about the probable practical value of the event; but the inclusion in the program of fuel consumption and hill climbing tests will lend variety to the affair, and ought to ensure additional public interest.

Of the proposed route, New York-Philadelphia -Baltimore-Washington-Pittsburg, it must be said that it fills the requirements of a great annual contest well. The first two cities are the chief automobile centres in the country, and Washington and Pittsburg also offer very promising markets for the automobile industry, the former on account of its large society and diplomatic population and the latter as a prosperous manufacturing city. Baltimore, owing to its wretchedly poor streets, has so far not taken much interest in automobiles.

The average of the roads of the proposed route is much poorer than the average roads between New York and Boston. From Baltimore to Washington and beyond the latter city the roads are especially bad. If the weather should turn out unfavorable no very large percentage of the competitors would cover the distance of 500 miles in three days, and the contest, in any event, promises to be a much more strenuous one than that of last fall.

Recent Advances in Ignition Apparatus.

Aside from the auxiliary spark gap discovery most of the recent improvements in ignition devices have had to do with spark generators. Some inventors have sought to make the rate of electrical generation independent of the speed of the motor, so that just as strong a spark is produced when the motor is turned over by hand in starting as when it is in normal operation and the necessity for starting batteries is avoided. Another inventor has set his aim in the direction of combining the advantages of the contact and jump spark systems by producing a mechanical generator, giving an electric impulse of such form that a spark can be produced within the cylinder of the motor without movable contact parts and without an induction coil.

In this connection attention may be called here to a novel spark generator described in another part of this issue. The device has none of the parts usually responsible for trouble with ordinary forms of spark generators, and is generally of extreme simplicity. The principle of action is a very simple one, and not new, but some of the details of construction are highly interesting. The aim of the designer has evidently been to obtain as strong an effect from a device of a given size as possible, and at the same time prevent a gradual weakening of the permanent magnets, which occurs in all ordinary forms of magneto generators. To this end two pole pieces are used, one of which only is surrounded by a coil. Normally the magnetic flux divides equally between these pole pieces, but when the cut away portion of the revolving armature comes around to the pole piece without coil it concentrates the magnetism in the pole piece surrounded by the coil and reduces the flux in the other, while a moment later, when the cut away portion arrives opposite the pole piece with the coil, the magnetism rapidly diminishes in that pole piece and increases in the other. Hence there is a sudden and large variation in the magnetic flux through the coil without any appreciable variation in the total flux between the magnet poles. Also, the impulse due to a decrease in magnetic flux through the coil is made use of for sparking and, as is well known, the direction of this current is such that it tends to strengthen the field magnets, instead of to weaken them, as is the tendency in the usual forms of magnetos.

The Paris-Madrid Disaster.

Mail reports are now to hand of the first stage of the Paris-Madrid race and the terrible accidents accompanying it, confirming in every respect the former telegraphic reports. The general opinion, even among the racing contingent, seems to be that this slaughter marks the end of long distance road racing in France, and that no further permits can possibly be issued. Premier Combes frankly admitted in the Senate that he had made a mistake in sanctioning the race, but offered the excuse that he had done so in the belief that the event would prove of benefit to an important national industry.

A more sudden change of public opinion has seldom been witnessed than that in France on May 24. The hundreds of thousands of people lining the road near the start in the small morning hours of that day were for the most part deeply impressed with the importance of the event they had come to witness, and the conversation centred on such subjects as the progress of practical science, La France once more taking the lead of the progress of the world, etc., but before the day was over these same people were clamoring loudly for the Government to stop the race. The French are naturally an impulsive race and one that easily forgets its lessons.

Great public indignation was man when in a motor cycle race in the spring of 1900 two

at a turning and ran into a crowd, y injuring several; and when a was run over and killed by one of npetitors in the Paris-Berlin race. the time of the next great racing hese accidents had been quite for- by the mercurial public.

Automobile Club of France is now ring to shift the blame for the ac- onto the Government, claiming precautions taken for policing the ere not thorough enough. This ssibly be responsible for the fatal ts to two or three persons outside e, but the accidents to the compet- ould not have been prevented by asures for guarding the course that have been taken. The deaths of ompetitors are simply the inevitable of the folly of running at break eed on the public roads.

is-Madrid and the Gordon Bennett Cup Race.

t the only comment on the horrors Paris-Madrid race by those who road racing as an essential to the ity of the automobile industry is uch nonsense is being written re- the event—which amounts simply vasion of the question. Some con- however, that to make road racing ghly safe in the future the most ent drivers should be selected in ting trials and the main race re- for these. This argument may plausible, but isn't it a fact that f the drivers involved in recent ca- hes—Zborowski, Renault, Barrow, were among the best known men in bile racing circles?

ediately the fatalities in the Paris- race became known the question fect they would have on the Gordon Cup race was raised. Those inter- the last named race pointed out the differences between the two events— velve competitors instead of 200; the only 93 miles in length instead of d every possible precaution taken the spectators off the road. Hence, gued, because there were fatalities Paris-Madrid race it does not follow ere is any great danger in the Gor- nnett race.

he Paris-Madrid race Marcel Re- ost his life because (on the author- he reports) he took a sharp turn at eat speed. There are many such turns in the cup race route. The chauffeur of Loraine Barrow lost his life because the vehicle ran into a big dog. It will be utterly impossible for the mana- gers of the Gordon Bennett race to keep all dogs off a road 93 miles in length. The chauffeur of Mr. Stead lost his life be- cause two vehicles hooked together while one was trying to overtake the other. The roads in Ireland are much narrower than in France—in fact so narrow at points that it is impossible for vehicles to pass each other—and the chances of "hooking to- gether" are therefore much greater.

It will thus be seen that all the causes of fatal accidents to competitors will also be present in the Irish race.

British Automobilists Decide in Fa- vor of Identification.

The Automobile Club of Great Britain and Ireland has just taken a postal vote among its members on the question of au- tomobile legislation. Three questions were propounded to the voters, substantially as follows: Are you in favor of (1) means of identification as a concession for the aboli- tion of the specific speed limit and tare limit for heavy vehicles? (2) nothing fur- ther being done by the club at present to promote legislation? (3) small and incon- spicuous identification plates, certification of drivers and an increase of the penalty for automobilists guilty of serious offenses, such as giving false names and addresses or endeavoring to avoid identification after causing an accident, in exchange for a re- moval of the specific speed limit?

The result of the vote was that members by a majority of 687 declared themselves in favor of the club promoting legislation and by a majority of 552 in favor of the legis- lative committee's proposals of means of identification.

After all the ridicule which had been heaped on the identification proposal it must have come as a surprise to many to see this proposal so strongly supported by members of the club. The automobilists of "proud Albion" resented the "indignity" of being numbered long after motorists of all other countries had submitted to it, but the constantly spreading police persecution, as well as the apparent increase in reckless driving, must have impressed the majority of the club's members with the neces- sity of something being done to improve the situation. The repeated reference to automobile regulations in Parliament re- cently and the expressions of the chairman of the Local Government Board for Eng- land indicate that further auto legislation is imminent. The result of the postal vote gives ground for the belief that in this coming legislation the club will present a united front.

Calendar of Automobile Dates and Events.

June 18—20.—Paris Automobile Fetes.
June 18—28.—Aix-les-Bains Auto Events.
June 20—21.—Circuit des Ardennes.
July 1—15.—Irish Fortnight.
July 2.—Gordon Bennett Cup Race.
July 3, 4 and 5—Endurance Run of the New York Motor Cycle Club to Boston and return.
July 12—19—Ostend Automobile Week.
July 24—Quarterly 100 Miles Trial of A. C. G. B. I.
August 10—22—Tourist Motor Bicycle Relia- bility Trials.

Recent Advances in Methods of Charging Electric Vehicles.

By Albert L. Clough.

There can be little doubt that certain important recent inventions in the elec- trical field are bound to exert a most favorable influence upon the future of the electric vehicle.

The new means for the conversion of al- ternating into direct current are here re- ferred to.

DIFFICULTIES OF CHARGING.

The most important cause which has prevented a more extensive adoption of electric vehicles has been the lack of charging facilities, except in the great cities. Of course, the restricted radius of action of these cars is a serious objection; nevertheless, it is sufficiently great to prove satisfactory in a great many lines of use, if conditions were such as to make charging possible wherever electrical en- ergy of any kind were available. This has not hitherto been the case, and this fact has up to the present time practically con- fined the electric vehicle to the large cities, where Edison current—the direct or con- tinuous current—is supplied. In the smaller cities and towns and in the very smallest places (few of which are without electrical supply) the alternating current is well nigh universal. This form of energy being entirely unsuited for charging bat- teries, there has been little incentive toward the ownership of electric vehicles in these places. In fact, the possibility of securing a direct current service from any central station seems to be diminishing rather than increasing, owing to the peculiar adaptability of the alternating system to cover large territories with little loss and to furnish energy at any desired pressure to lamps and motors. It is probable that we shall in the future see very little direct current dispensed from central stations.

This being the case, the outlook for the charging of electric vehicles would be

very dark, were it not for the development of the static rectifier.

CHARGING FACILITIES IN CITIES.

The owner of an electric vehicle in one of the large cities where the Edison current is supplied has been able, by means of a simple connection to the direct current mains through a rheostat, measuring instruments and automatic switch, to conveniently charge his batteries in the stable at a cost not prohibitive, and as a rule public charging stations have been located conveniently about the city at which he could recharge, if necessary. The possessor of an electric carriage living in a community where only the alternating current is supplied, in order to arrange for charging in his stable has been forced to go to very great inconvenience and expense. He is forced to install a veritable power station, costing several hundred dollars and requiring a good deal of care. There are two courses open to him. First, to install a gas or gasoline engine and use it to drive a direct current dynamo, which, in addition to charging his automobile batteries, may be used to furnish house illumination, or, second, to purchase a motor generator set, consisting of an alternating current motor of the single or multiphase type, direct connected to a direct current generator. He then buys his electrical energy of the central station in the alternating form (which he cannot use directly) and transforms it, with considerable loss, into continuous or direct current. The motor converter, which consists of a double wound dynamo, with its armature fed by alternating current and delivering direct current from its commutator, may also be used, but this type is not known to be in the market commercially.

EXPENSIVE PLANT.

Both of these forms of charging plant, with their accessories, are expensive to install, and they require a certain amount of attendance; although the motor generator sets are nearly automatic. They also occupy valuable space in a stable. The first method is by far the cheaper in operation, although somewhat objectionable in other ways and requiring a little more attendance than the latter. Owing to the high rates often charged for alternate current in residence service and the loss of energy in the motor and the generator, which is quite large in these small machines, the total cost of the energy delivered to the battery by the second method is very considerable. Where the central station supplies electricity at 20 cents per kilowatt hour, or 15 cents per electrical horse power hour, the cost at the battery terminals will be in the neighborhood of 25 cents per horse power hour when a motor generator is employed—no allowance being made for attendance or fixed charges.

Naturally there are very few people who are able or willing to install so extensive an electrical plant on their premises, and very few public charging stations will be fitted up in towns where only the alternating current is to be had, as the expense is not likely to be warranted, especially as there will probably be but few vehicles to be charged.

In almost every community there is a class of people who wish a vehicle for purely local use, and do not demand extensive mileage capacity. Many of them do not care within reasonable limits what their horse power hour costs, but they value the undoubted noiselessness, readiness and ease of operation of the electric vehicle, and would adopt it if they could secure practical charging facilities, both public and private.

The inventions to which these remarks refer and which promise to render superfluous the costly, complicated and cumbersome apparatus now necessary for charging from the alternating current at present of so nearly universal application, have both been referred to briefly in THE HORSELESS AGE, but a brief description of them may not be amiss.

THEORY OF NEW CONVERTERS.

Almost everyone is aware that an electric current, if allowed to flow in a constant direction through a chemical solution, will resolve that solution into its chemical elements. These elements will appear at the two points or poles at which the current enters and leaves the solution, and a certain one of the chemical elements will invariably appear at the pole at which the current enters, while the other will invariably appear at the pole by which the current is leaving.

Suppose, for example, that the chemical substance acted upon is water, which contains two volumes of hydrogen and one volume of oxygen, and suppose means are provided to retain these gases at the poles where they are produced. If the current be passed for one minute in a given direction, 1 cubic inch of oxygen will be found at pole A, while 2 cubic inches of hydrogen will accumulate at pole B. Suppose now that the curent is reversed in direction, entering at the pole from which it previously left, and leaving at the pole by which it previously entered. After the end of one minute there will have been produced at pole A 2 cubic inches of hydrogen, and at pole B 1 cubic inch of oxygen. During their formation the 2 cubic inches of hydrogen will combine with the cubic inch of oxygen previously at pole A, and the cubic inch of oxygen will combine with the 2 cubic inches of hydrogen previously formed at pole B, forming in both cases the same amount of water from which the gases were originally obtained. In other words, the result of passing the current in opposite directions for equal lengths of time has been nil. If the current had been passed through a cell of storage battery instead of through water, the result would have been the same. The effects of the current first passed would have been wiped out by the equivalent current of opposite direction.

Now the alternating current is nothing more nor less than a current which passes alternately in opposite directions. For about one-one hundred and twentieth of a second it flows in one direction. During the next one-one hundred and twentieth of a second it flows in the opposite direction, and it is obvious that each momentary flow wipes out the chemical effect produced by its oppositely directed predecessor. In any given length of time the capacity of an alternating current to do chemical work is just equal to its capacity for undoing the same chemical actions.

If by any device it were possible to cut off the current during every other alternation of direction of the current and to allow the remaining instantaneous currents to pass into a storage battery, there would be no such doing and undoing of chemical work; the current would be in the same direction all the time, although it would be intermittent, and charging would be effected.

ELECTROLYTIC RECTIFIERS.

It is just this which is accomplished by the static rectifier or "electric valve," as it has been called, owing to the analogy between its action and that of the common check valve, which allows fluids to pass in one direction only, automatically closing against flow in the opposite direction.

A form of static rectifier which has been developed abroad consists of a vessel containing ammonium phosphate in which are two plates, one of iron and the other of a zinc-aluminum alloy. When an alternating current is caused to flow between these two plates only its alternate waves are allowed to pass, that is, the currents having the same direction. The other waves are suppressed and an intermittent current of constant direction results which is suitable for battery charging. The action of this device is supposed to be due to the formation of an insulating layer of oxide upon the aluminum plate when the current is in the direction to free oxygen thereat. The resistance of this film opens the circuit and prevents currents in this direction from passing. When, however, the current wave is of the opposite direction the oxygen is freed upon the iron plate and its flow is not impeded.

THE COOPER HEWITT CONVERTER.

More interesting than this rectifier is that of Peter Cooper Hewitt, of New York city. If the statements of the technical and popular press be accepted this apparatus offers a most satisfactory solution of the problem of obtaining direct current from an alternating supply. The Hewitt rectifier consists of a nearly spherical bulb in which are sealed two iron terminals, one at the bottom and one at the top. The bulb is exhausted of air and filled with mercury vapor, and liquid mercury surrounds the lower terminal. Another terminal is provided for the entrance of the high tension current required to start the rectifier into action.

This very simple arrangement when connected to an alternating circuit, after the current has once been

tween its terminals by the starting voltage, will allow only one set of the alternating current waves to pass, and thus furnish to its circuit an intermittent but direct current, suitable for battery charging. When the device is made for three phase circuits, it is provided with three terminals at the top of the bulb, in addition to the starting terminal, and one mercury terminal at the bottom. The upper terminals are respectively connected to the three phases and the mercury terminal to the common junction. The direct current in the common wire is then much less pulsating than that produced by the ordinary alternating current, on account of the overlapping of the phases.

The theory of action of the Hewitt apparatus has not been fully investigated, or, at least, not made public, but the secret of its working is generally supposed to be connected with the resistance changes of the mercury vapor under polarization.

DETAILS AND PROSPECT OF HEWITT RECTIFIER.

A Hewitt rectifier capable of delivering 8 kilowatts of pulsating direct current at 110 volts is said to be about 9 inches in diameter and to weigh about 3 pounds. It should be inexpensive to manufacture and ought to sell, even when patent rights are provided for, at a very reasonable price. The installation of such a bulb in the stable with the necessary regulating and indicating apparatus, should not prove a source of great expense, and, if its economy is as good as claimed, it should be a satisfactory means of solving the charging problem.

It is proposed further to make these bulbs of unbreakable material, so that they may be readily portable, in which event it might prove practicable to carry one, together with the necessary regulating and measuring apparatus, upon the electric vehicle, thus rendering it possible to charge wherever the "juice" was to be found, which today means almost literally everywhere.

I venture to say that these inventions of static rectifiers for alternating current will have a more important effect upon the future of the electric vehicle than many of the alleged improvements which have lately been made upon the battery itself.

Second Hand Gasoline Vehicles—How to Determine Their Condition.

By Albert L. Clough.

Many people who do not feel like investing the full price of an automobile, new from the factory, in order to secure a first experience with a motor car, very naturally seek the second hand market to find what it affords in the way of bargains. Many of these people think it wise to purchase a second hand vehicle, so that their apprenticeship in motoring may be served upon a car of comparatively small value, any accident or lack of attention to which will be less serious than to a new and high priced rig. Such people generally look forward to the ownership of a new and first class car when the old one shall have been worn out and full experience in the care of motors attained.

Fortunately, the second hand market offers a line of vehicles of every description, from a motor "bike" to a 24 horse touring car. The vehicles there offered are generally placed for sale through one of the following causes (disregarding the usually assigned reason, "owner going to spend the summer abroad," or "owner has ordered larger car of same make"): First, the car is a failure through bad design or bad workmanship; second, the car is a good one, but the owner has become tired of it, either because he never had the qualifications for an automobile operator or through some other reason; third, the car has gone out of fashion and thus does not suit its owner.

Vehicles which are placed for sale on account of the first reason are naturally to be avoided, but it is not always easy to be sure of so doing. The vehicles discarded for the second or third reason are oftentimes very good bargains. Many a car has been bought in a moment of enthusiasm by someone who never should have owned any means of conveyance more powerful or complicated than a pair of roller skates. After a few days' use and one or two slight "lessons of the road" the owner concludes that he would rather have a horse. It is surely for the good of the motor industry that he comes to this conclusion. His rig, however, may be a very good one, and in very passable condition.

The owner who discards a machine simply on the ground that it is not the latest thing out is a godsend to the automobile dealer, and makes many contributions to the second hand market which can be picked up by sensible people to their great advantage. It is a fact that some of the machines made several years ago are about as serviceable today as many of the 1903 models, although appearance is against them to such an extent as to depreciate their value to almost nothing among the smart set. Buying horses is supposed to rank as one of the most uncertain business transactions that can be undertaken, and it is probable that buying a second hand automobile is fraught with a good many of the same risks, for there are certainly many in the business who could out-Harum David Harum.

PARTY TO INSPECT.

When a person goes into the second hand market with the view of purchasing a machine he will do well to confine his choice to vehicles of standard make constructed by concerns who are still in the field and who maintain factories at a reasonable distance from his home.

It is hardly practicable to make any suggestions as to the points of design which should be sought for in a second hand machine, but it may be of use to give a few pointers to assist the purchaser in determining the condition of the vehicles offered. It is worth the small expense involved to take along with one, when looking the machines over, a thoroughly skilled and experienced mechanic, not necessarily an automobile mechanic. He will notice a great many points which will entirely escape the attention of the ordinary purchaser, and his advice will likely be sound upon a great many practical questions.

It will here be assumed that a gasoline vehicle is to be purchased and that a car of some standard make has been fixed upon. In looking it over, the first thing to be determined is how much worn it is. The steering gear will give useful information as to this by the amount of lost motion which it contains. If the steering wheel or tiller will move considerably without deflecting the wheels, and all connections are tight, it is pretty evident that there has been much wear in the pivots due to extensive use. If the wheels are of the wire type the condition of the spokes where they screw into the nipples should be noticed, as this is the weakest point, and if the wheels are of the artillery type one should examine to see if they run true. The wheels should stand in exactly parallel vertical planes when the weight is upon them, and not lean together at the top. If they do lean together, it rather indicates that the axle or steering pivots may be sprung or that the bearings may be worn. The axles should be looked to very carefully to see that they have not been forced out of true by use. It is difficult to determine how much the bearings of the front wheels may have been worn unless the machine is jacked up. If so it can be easily determined. It is also very difficult to determine the condition of the axle bearings. Driving sprockets that have been used for a long time give evidence of wear by the irregularity of the tooth outline. The driving side of the teeth is hollowed out while the slack side shows little or no wear. In a sprocket which has not been much worn the two sides of the teeth are alike. An inkling as to the condition of the differential gear may be had, if the rear wheels are jacked up, by turning the wheels by hand and looking for lost motion arising from the wear of the teeth of the gears and pinions. The radius rods should be inspected. If the vehicle has been extensively used, these rods at their connections with the rear axle and with the frame will probably show some pivot wear, which can be detected by handling the rods. When looking over the springs any signs of their having frequently struck together, through weakness, should be noted. Of course, one need not expect to find perfect tires upon a second hand rig, but it is natural to look them over for external defects, such as cuts, vulcanizations, plugs or flatness on the tread, due to long wear.

A BAD SIGN.

One thing which it is interesting to ascertain is as to whether the vehicle has been taken apart frequently. This, as a rule, is a bad sign, and a good machinist will usually be able to make a good guess

as to this, unless the car has just been repainted. Repainting of the gear and body and bronzing of the mechanism is a common expedient of the second hand dealer to add to the attractions of his stock in trade. Paint, like beauty, "is only skin deep."

The value of the inspection which can be made will depend largely upon the completeness with which the mechanism can be "opened up" to view. All removable portions, such as the flooring, tonneau, bonnet, seat boards, etc., should be laid back. If any objection is made to this, obviously there is something to be concealed. The covers of crank cases and gear boxes should be removed whenever practicable.

THE DRIVING MECHANISM.

The first point regarding the driving mechanism, about which one is likely to be curious, is the compression of the engine. With the relief cock closed one should not be able to make it pass compression until after the lapse of a considerable time, during which the air is gradually leaking away. In an engine of large cylinder capacity and in perfect condition it should not be possible to pass compression except by brute strength. With the crank case cover off it will be possible to tell whether the escape of the charge is by the piston or by the valves. If the pistons are not reasonably tight it will be difficult to obtain a satisfactory output from the motor, but if the leak is in the valves it is to be presumed that it can be stopped. An engine with ill fitted pistons will probably prove a bad investment.

Some idea may be obtained as to the condition of the reciprocating parts of an engine, when a liberal hand hole is provided in the crank case. By putting the cylinder upon the beginning of the compression stroke and allowing someone to rotate the balance wheel slightly back and forth, looseness in the connecting rods at the crank pin and the piston pin may often be detected. Much lost motion at these points evidences considerable use of the engine, but its correction is not a very serious matter. Wear in the main crank shaft bearings should be looked for.

IGNITION MECHANISM.

The condition of the spark timer should be examined, as the condition of the cam springs and other parts will bear testimony to the work the engine has done. The secondary shaft which carries the cams should not be loose in its bushings in the crank case, nor should the gears which drive it show much backlash. Evidences of the crank shaft having run hot at any time should be noted.

THE CLUTCHES

ought to be examined with a view to determine how much more adjustment for wear is still to be had. A machinist will readily answer this question. Not only the wear of the actual clutch surfaces, but that of the operating fingers or toggles should be considered.

Any looseness of the transmission gear shafts in their bushings can be determined by slightly prying the shafts apart, if the transmission device is accessible. The gears ought to show nearly the correct tooth outline, and if there are sliding pinions they and the gears which they engage should show very little evidence of battering upon their edges.

The linkage which operates the brakes ought not to show evidence if excessive wear.

THE COOLING SYSTEM.

It ought not to be too much to ask to have the cooling system filled with water and the gasoline tank with gasoline. The radiators should then be inspected for leaks with the greatest care, and the pump and tank as well.

If its condition has passed muster a demonstration of the capabilities of the car should be asked for, and the intending purchaser should be present when the motor is started. If there is any hill in the vicinity which the demonstrator seems unwilling to climb, the machine should be viewed with suspicion.

In conclusion it may be said that a machine which shows looseness and wear in most of its parts, has badly fitting pistons and shows unmistakable evidence of having been frequently taken apart and partly rebuilt, will be a poor investment except at a very low figure—no matter how bright the varnish is or how many brass lamps it carries.

On the other hand a vehicle in which everything has been kept tight and well lubricated and cared for, may sometimes be picked up at a price which will make the investment a good one. If its design and type are what the purchaser wants, he may do as well with it as with a new machine.

Commercial Vehicle Contest Awards.

Official awards to the winners in the Commercial Vehicle contest, held in New York city on May 20 and 21, have been made by the A. C. A. as follows: First class (to carry 750 pounds): No. 10, Mobile Company of America, Tarrytown, N. Y., steam, gold medal; second class (to carry 1,500 pounds), No. 11, Knox Automobile Company, of Springfield, Mass., gasoline, gold medal; No. 12, Knox Automobile Company, gasoline, silver medal; No. 5, International Motor Car Company, Toledo, Ohio, Waverley electric, bronze medal. Third class (to carry 3,500 pounds), no award. Fourth class (to carry 6,000 pounds), No. 9, Morgan Motor Company, Worcester, Mass., 3 ton steam truck, gold medal. Fifth class (to carry 10,000 pounds), No. 1, T. Coulthard & Co., London, England, 5 ton steam truck, gold medal.

The committee has not yet made its full report on the contest. It is the intention to issue a very complete report, and the work will therefore probably occupy some time yet.

LESSONS OF THE ROAD

An Involuntarily Prolonged Trip.

By Harry B. Haines.

As I am always on the lookout for new things—or perhaps it would be better to say for things that are new to me—in the automobile line, I accepted the invitation kindly extended to me by a friend this week and went out for a half day's ride in a second hand car that he had purchased, and oddly enough our little jaunt occupied a day more than we had anticipated; but being used to automobiles, I did not mind that in the least. It has always struck me that telling about other people's automobile troubles is somewhat akin to the sensation experienced when spending other people's money, and at times there is a certain amount of satisfaction in both of these occupations.

The machine in question was equipped with a three cylinder engine which was placed directly beneath the seat and tipped at an angle of 45 degrees. The body was of the dos-a-dos type, with a large canopy top fringed on the sides and so designed that in case of trouble the passengers were piled out and the top tipped back on hinges, allowing the entire inner mechanism to be reached in a most convenient and comfortable manner. It was not much of a car for looks, having a sleigh front with long curved springs rounding over a leather dash and being fitted with 30 inch wheels in front and 36 inch wheels in the rear; but my friend assured me that the machine was "just as good as new," had just been thoroughly overhauled at the factory, and was ready for any and all tests.

"FACTORY OVERHAULED."

I have had a few experiences personally with factory "overhauled" machines, but I kept my opinions to myself, and after telephoning to my folks not to worry if I did not return home that night, I climbed in and we were ready to start off. The tanks having been all filled it was only a case of turning the handle to start the motor, but for some reason or other the motor did not "mote," and my friend called for assistance from within the storage station in front of which we were standing.

After much turning it was finally decided to lift up the body and have a look inside, and I piled out for this purpose. The engine once exposed did not solve the mystery, but luckily it was noted that the men at the factory had neglected to quite tighten up the brasses on the crank pin bearing, and these had about an eighth of an inch play. It was necessary to fill up this "aching void" with shims before we could proceed, and this once done I was foolish enough to stand looking down into the tin crank case that acted

ceiving vault for the oil used in the splash feed.

It didn't take me a minute to realize the mistake I had made, for, strangely enough, the engine started at the first turn and the splash feed began to work. It took about twenty minutes to wash the oil out of my hair and scrub it off my face before I was in condition to talk auto again. I have nothing derogatory to say about this system of lubrication except that in the future I intend keeping out of the direct line of the oil dabbling cranks. After this brief delay everything seemed to be all right and we started off, my friend at the throttle and the motor buzzing along fairly well.

This particular machine has a contact or make and break spark of original design, and I noted that the first cylinder exploded when the engine was on the quarter turn and compressing for the others, and they tagged along afterward at irregular intervals, apparently as fancy struck them, giving the machine a rather jerky motion.

The transmission, which was a combination of the sun and planet and sliding gear types, gave two speeds forward but no reverse, a fact which we found out with a decided jar later in the day. The flywheel, which the manufacturers claim is a light one, weighs about 250 pounds and encourages the motor considerably when the spark feels in working condition.

We had gone about 50 yards from the store door when the machine suddenly slowed down, with the motor racing merrily and my friend jamming on his high speed lever. It was no go, and we stopped the motor, or at least he did, while I walked back to the repair station for assistance. A mechanic was sent out, and after putting the body back out of the way discovered that the teeth had been sheared off the high speed clutch, so that they would not hold. The machine was pushed back to the storage station, and I sat down to read for a while, until the transmission was pulled apart and the teeth filed up again so that they would slide into place. This took about an hour, and even at this time my friend was still determined to start for a run to New York despite the fact that it was then late in the afternoon.

REAR AXLE BREAKS.

I was still game; the machine was started off once more, and we rode down the street. Everything went along without mishap for the first 8 or 9 miles, except for the irregular action of the motor as it skipped spark from time to time, and finally while we were having a brush with a 5 horse power motorette and were rapidly overtaking it, there came a smash and a grinding of gears that made me think that a small sized earthquake was doing business behind us. The back of the wagon went down with a dull, sickening thud, and the motor tugged and tore on the driving chain and dug holes in the ground. I was out on the road quicker than it takes to tell it, and my friend shutting off the motor followed me. It was plain at a glance that the rear axle had broken, and the engine before it had stopped had gouged a hole out of the body, and dug a fair sized cellar foundation in the centre of the road.

For a moment or so I felt like giving up, and was ready to count up my small change and see if I had car fare home, but on second thought I decided to stick it out and to overcome the hoodoo if possible, for strangely enough we were almost at the same spot where my own rear axle had broken a week before. The first thing to be done was to jack up the machine, and we secured some logs from a wood pile for this purpose, using fence rails as pry bars with which to lift up the machine. Upon examination it was found that the rear axle, which was an inch bar of solid steel, had snapped in two at the right of the differential, in a place where it had evidently been welded together before. This axle was squared on the ends, and the rear wheels were driven onto it, pieces of nails being used in lieu of cotter pins, and this rather shiftless job being hidden by aluminum caps.

DISSECTING A DIFFERENTIAL.

It was up to us to dissect the differential gear, and this proved to be an easy task compared to the job we had to get this together later, as the gear was held together by nails and screws of various lengths, which were almost equal to a Chinese puzzle when it came to making each of them fit in their respective places, after the proper place was once found. We finally managed to get the axle apart, and I with one-half of it and my friend with the other half trudged to a blacksmith shop a mile away to get the thing fixed, while an obliging boy perched himself upon the auto seat to watch the machine, he having volunteered to perform this service if we would let him toot the horn.

As a persistent tooter this boy was a winner, and he still had the horn going full blast when we returned from the blacksmith shop two hours later. The old portion of the axle had been badly burned near the welded joint, and we had a section a foot long cut out and a new piece welded in its place. It was dark by the time we got back to the machine, and as both my friend and I were tired out we decided to put up for the night and get to work bright and early in the morning. We secured two lamps and hung one on either end of the machine, which occupied a rather prominent position, taking up half of the road, and both turned in, leaving a call for 5 o'clock. I have often slept in more luxurious quarters, but I remember never having enjoyed a sleep more than in that country tavern, and in the morning when we were awakened I was ready for anything that might come along in the way of difficulties.

With a persistency worthy of a better cause my friend insisted, after three hours' work in getting the axle in, that the trip to New York be completed, and as we were near the end of our journey I consented. Our accounts having been squared at the tavern, we started out and reached the famous Kelly's Hill in good shape, sailing past the sign that is prominently displayed at the foot of the steep climb and reads: "Teams to Hire for Towing Up Kelly's Hill." We started up the climb on the high speed, but were soon in the low gears, and when about half way up, just as we were coming to the hardest pull, the motor slowed down and showed signs of stopping, and my friend becoming excited threw out the gears.

We at once started backward, and in order to avoid a collision with a little four horse power single cylinder car that was haughtily climbing the grade, we slid into a gully and then coursed over a lawn and part of a field, grazing a cow by a margin that fairly made the bovine's hair rise. We finally came to a standstill at the bottom of a small gully fifty feet off the main road and got out, both being devoutly thankful that we were able to do so.

A REVERSE SORELY NEEDED.

The wire connections were all gone over, and finally the motor was started again, but we found that we had no reverse and were unable to get out of the gully. It was up to me to walk back to the foot of the hill and barter with the owner of two likely looking "hay motors" to pull us out of our slough of despond. At first he mistook me for a capitalist and wanted $3 for the job, but I finally convinced him that 75 cents was a fair figure, and he agreed to tow the machine for that price.

He came up the hill, hitched a rope to our stranded bark and pulled it back on the road, and then dragged us up to the crest of the hill and turned us adrift again. With his ever ready crank my friend and chauffeur turned away and finally got his motor going again, and we rode down to the ferry in fairly good order. While we were crossing in the boat I noticed that the splash feed oiler and other grease dispensing mechanisms had been getting in their work, and that I was not in a very presentable condition to return to my work on the train, as I intended. Luckily, I had relatives in the metropolis, and going to their home I scrubbed myself back into cleanliness and was able to become fairly presentable.

I journeyed back home on the train and my friend at last accounts was bound for a repair station to have the car overhauled again. He had always been a steam man, and this was his first gasoline venture. I have not had the nerve or courage to ask him how he liked the change, but intend doing so over long distance telephone some day.

The French Motocycle Club has decided to organize a big endurance contest specially for motor bicycles from 1 to 3 horse power.

Maintenance and Repairs.

VI—Cracked Water Jackets.

By W. O. Anthony.

Many schemes have been devised to do away with cast iron water jackets, upon which freezing of the water therein usually produces such disastrous results. Most of the substituted constructions are eminently successful, being much lighter and even withstanding an occasional "freeze up," the only result of this being a stretching of the metal, usually copper or brass. For some time to come there will, however, be many cast iron water jackets, and as "to err is human" and once in a while we get caught by an unexpected cold spell, a description of the method employed by the writer in several cases of bad breaks from this cause may enable the owner or repair man to avoid the usually heavy expense

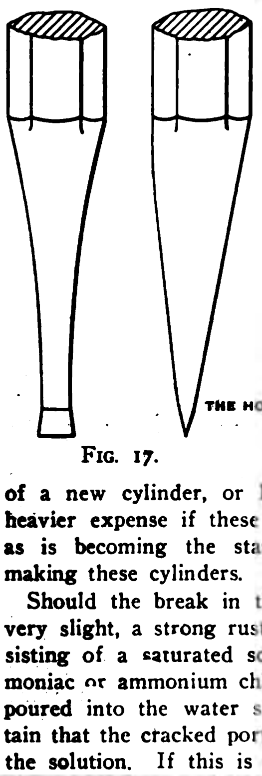


FIG. 17.

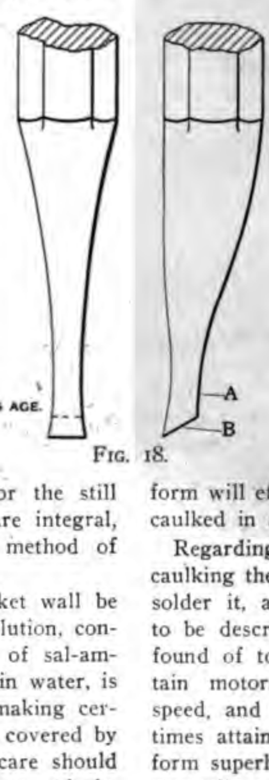


FIG. 18.

of a new cylinder, or head, or the still heavier expense if these two are integral, as is becoming the standard method of making these cylinders.

Should the break in the jacket wall be very slight, a strong rusting solution, consisting of a saturated solution of sal-ammoniac or ammonium chloride in water, is poured into the water space, making certain that the cracked portion is covered by the solution. If this is used, care should be exercised to avoid getting any of the solution inside the cylinder, and the cylinder should be set in a warm place and allowed to stand for a day or two.

It is seldom, however, that this method will be successful, as the cracks are generally too wide to be filled solidly with the rust resulting from the action of the solution.

By the following method the writer successfully repaired a badly cracked jacket, the crack extending the whole length of the cylinder jacket and up nearly half the diameter of the head, and besides the main crack there were a number of small ones radiating from a point at the bottom and much resembling in appearance the spokes of a wheel. The motor was a double cylinder, horizontal, opposed, and at first glance it seemed as though there was no remedy except new cylinders and heads, these two being integral in this case. Two small cold chisels were made, one like Fig. 17, the other like Fig. 18.

Removing the cylinders from the machine, with the chisel first mentioned, a groove as narrow as the widest part of the break should be cut for about one-eighth inch in depth, and following the crack and bringing it about in the centre of the groove all the way.

Should there be much variation in the width of the original crack, it might be well to have made several widths of both styles of chisel, using the narrower wherever possible, for the groove should be made no wider than necessary to cover the crack.

It will require some care in cutting these grooves, because some of these cast iron jackets are quite thin, and too hard blows might break through.

The chisel must be kept sharp. After cutting a groove with the chisel shown in Fig. 17—and by the way, it should be stated that both these chisels are a little wider at the edge than just above it, to avoid binding—the chisel shown by Fig. 18 should be run over the grooves with the side A at the bottom and it should be held with the edge B about parallel with the surface of the jacket. The object of this latter chisel is to dovetail the groove, making it slightly wider at the bottom than at the top—as shown in Fig. 19. This form will effectually secure the metal to be caulked in against coming out.

Regarding the metal most suitable for caulking the groove, it is slightly easier to solder it, afterward caulking with a tool to be described; but this metal has been found of too low a melting point in certain motors, running at high rates of speed, and where the jacket water sometimes attains so high a temperature as to form superheated steam. This condition is generally attributable to defective circulation, due to partial or complete stoppage of the circulating pump. Where the crack to be mended is at the bottom of the jacket wall, solder may be quite safely employed. Soldering coppers, weighing 2 or 3 pounds each, should be employed for this work, as an iron of much less weight will not hold the heat a sufficient length of time, and in any event the whole cylinder and its jacket must be heated quite hot by a blow torch or by being placed in a hot oven for an hour or so.

There are many solutions used as fluxes for different metals. A good flux to use in this case is known as "cutter" acid. s is prepared by adding one part by

FIG. 19.

bulk of commercial hydrochloric or muriatic acid to two parts of water and dissolving scrap zinc in this solution until the acid is neutralized. This solution becomes more efficient with age, and should be allowed to stand for several days, tightly corked, before being used. With a flat brush, made by fastening bristles from an old dust brush into the end of a flat tin tube, as in Fig. 20, squeezing the end together in a vise, after inserting the bristles, coat the inside of the groove, an inch or two at a time, with the acid solution, and then allow the solder to drop into the groove where thus treated by holding the hot soldering iron against it and following it along. It is a good plan to follow the iron with a blow torch, directing the flame against it and the work. In this way the groove may be completely filled with solder; but unless the work is watched very carefully air bubbles will form underneath and only a film of solder form across the top of the groove. This condition of affairs will be found when the job is finally caulked; but it may be overcome by running a piece of fine steel piano wire into the molten solder in the groove, and working it back and forth, when the air is quite sure to follow the opening made by the wire, and escape.

After going over the whole job in this way, the soldered joint should be caulked with a tool like that shown in Fig. 21, having a concave groove in its edge of about the width of the caulked groove, or perhaps a little less.

This caulking compresses the solder in the groove, thereby helping materially to make a tight joint. After caulking, the joint should be resoldered on the outside, more for the sake of appearance than anything else, and after filing off any surplus solder and repainting, it would take a sharp eye to detect any evidence of a break.

As before stated, in many machines the solder is almost sure to melt and run out

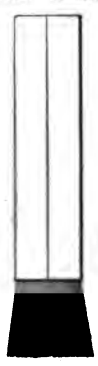


FIG. 20.

at points high up in a horizontal motor where the heat is most intense and the natural circulation not always of the best. In such places the groove may be caulked with soft copper, and a job of this kind properly done almost defies detection, and of course cannot melt and run out under extreme conditions. For this the purest obtainable copper rod, about three-sixteenths inch diameter, should be secured.

This may be softened by heating to a red and dipping quickly into cold water, and this should be done by all means, as it renders the metal much easier to caulk, and the blows, incurring always more or less risk, are lessened in proportion. Unless flat copper rod can be secured, the round rod should be flattened to a thickness which will just enter into the outer part of the groove, and the aim should be to have as few joints as possible, selecting the longest part of the break and cutting off a few inches more than enough for it, to facilitate handling.

One end of the piece of copper is to be placed at one end of the groove, and with the face of an ordinary machinist's hammer, weighing about 1 pound, it should be firmly driven down into the groove for an inch or so in length and hammered until it has spread down in the groove and filled every crevice.

Having secured one end in this manner, the rest of the piece should be driven down into the groove, but not finally spread, the idea being to spread it, as nearly as possible, all at once, and avoid the rather sharp kinks which would otherwise be formed. By hammering until the copper begins to spread materially at the top we may be reasonably sure that it has filled all the crevices in the groove. When filed off even with the surface of the jacket the job is, or should be if carefully done, extremely satisfactory.

It sometimes happens that the expansion in freezing will force out part of the metal of the jacket, so that neither of these methods can be employed as a repair, or if they can be the result is not at all sure to be lasting, and in such cases a method now to be described will work very nicely, but has the disadvantage that it disfigures the cylinder, bearing always mute evidence of disaster and sometimes interfering with a subsequent sale of the machine.

Chalk over the surface upon and for an inch around the break with blue chalk, or smear it over with a thin mixture of lampblack and oil. Now cut a piece of soft, clear pine the shape of the outside of the marking, and holding the piece against the broken place in its relative position the high parts will be shown by markings upon the wood. These should be worked down with a chisel and gouge until the piece bears quite uniformly over the broken part. Now trim off the top, as nearly as possible making top and bottom parallel with one another, and have cast in copper or soft brass. Drill for No. 12 machine screws around the edge about one-half inch apart, and drill and tap into the jacket through these holes.

Mix up a small quantity of "Smooth On," as it is called, and smear it over the broken part for a depth of about three-sixteenths inch, and tighten up the machine screws until the preparation oozes out around the edges. This sets in a few hours and forms a hard, strong cement, unaffected by either heat or moisture. As many may not be aware of the place of manufacture of this preparation it might be well to state that it is made by the "Smooth On" Manufacturing Company, Jersey City, N. J.

The amount of work necessary in fitting the wooden pattern for the copper casting may be reduced very greatly by securing a sheet of paraffine wax about three-sixteenths inch thick, and by holding for a few seconds in a dish of warm water this will soften and become pliable, so it may be bent to the exact shape required, and the cast made from this as a pattern.

Another method of repairing a bad break which may not be caulked, which may at this point suggest itself, consists in making a number of strong iron bands to go around the outside of the jacket at points close enough together to enable them to draw the joint tightly together, if it has not been too badly distorted, when a rust solution may complete the repair. This method makes a very bungling job, however, and it is very doubtful if it possesses any advantages over the first described methods.

NEW VEHICLES AND PARTS.

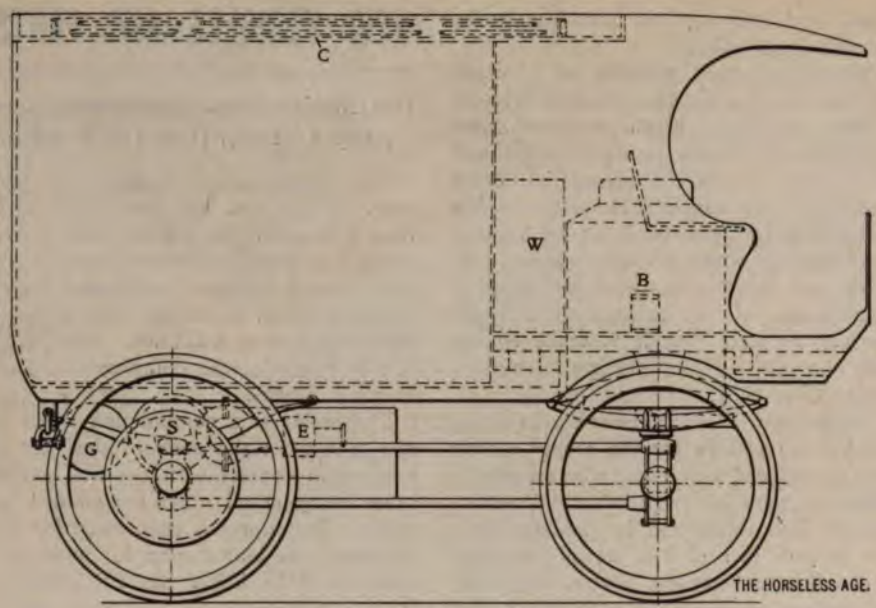
The Empire State Engineering Company's Steam Delivery Wagon.

The Empire State Engineering Company, of 533 and 555 East 116th street, New York city, have built a steam delivery wagon, herewith illustrated, which they had entered in the Commercial Vehicle Trials of the A. C. A., but were at the last moment forced to withdraw. The machine is the design of the company's engineer, Harry J. Marks.

The boiler is a combination water and fire tube type, the ends of the tube not coming in contact with the fire, and the tubes being at all times surrounded with water. Provision has been made for readily taking the boiler apart for purposes of cleaning. The boiler has a heating surface of 75 square feet, and under tests is said to have evaporated 400 pounds of water per hour. It is placed in full view of the operator, with try cocks and gauge within easy reach.

The engine is of the compound marine type, and is located on the running gear frame near the rear axle, in a horizontal position. The rear end of the engine is supported by means of trunnions, and the front end is spring hung. The engine is geared to a countershaft above the rear axle, which carries the differential gear. At the end of this countershaft are located spur pinions, which are in mesh with spur

"EMPIRE" STEAM DELIVERY WAGON.



SIDE VIEW OF "EMPIRE" DELIVERY WAGON.

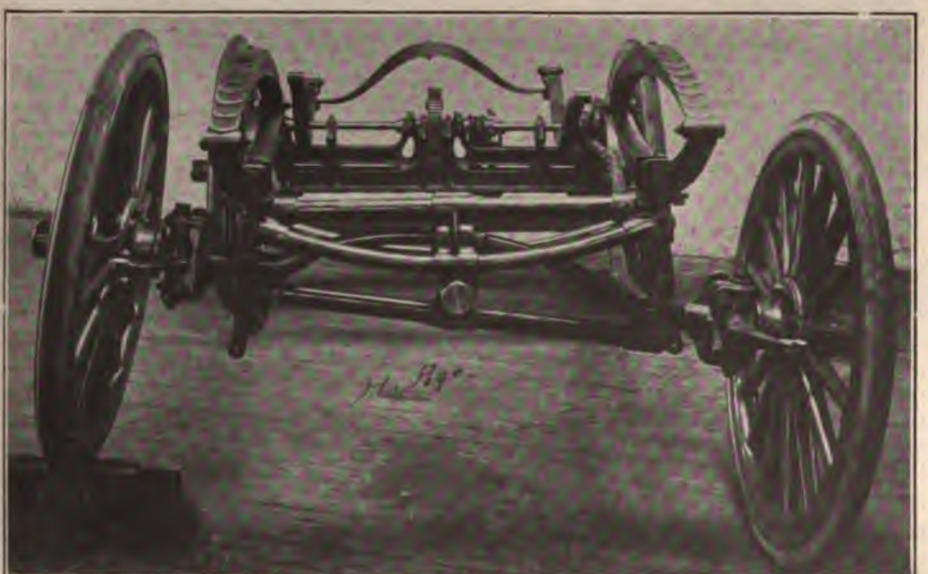
B, boiler; W, water tank; C, condenser; G, gasoline tank; E, engine; S, countershaft.

gears on the rear wheels. The engine and driving mechanism are entirely enclosed. This method of engine suspension and drive has the advantage of avoiding a chain and sprocket, and permitting of the use of a solid rear axle.

The exhaust steam from the engine passes through an atmospheric condenser located in the roof of the body, which returns a large percentage of the condensed steam to the water tank, to be used over again. The steam which does not condense passes through a coil in the smoke pipe to be superheated and to be thus rendered invisible.

A slow acting self contained pump driven from the countershaft through the medium of spur gears is used to feed the boiler when the wagon is in motion. A small steam pump is used as an auxiliary. The boiler pressure is carried at 200 pounds per square inch, and the maximum power of the engine is stated to be 12 horse power. The vehicle is fitted with a double acting brake, which is applied direct to the gear drums on the rear wheels. The wagon has a wheel base of 78 inches standard tread and wood wheels of 38 inches and 40 inches diameter in front and rear respectively. The wheels are shod with solid rubber tires.

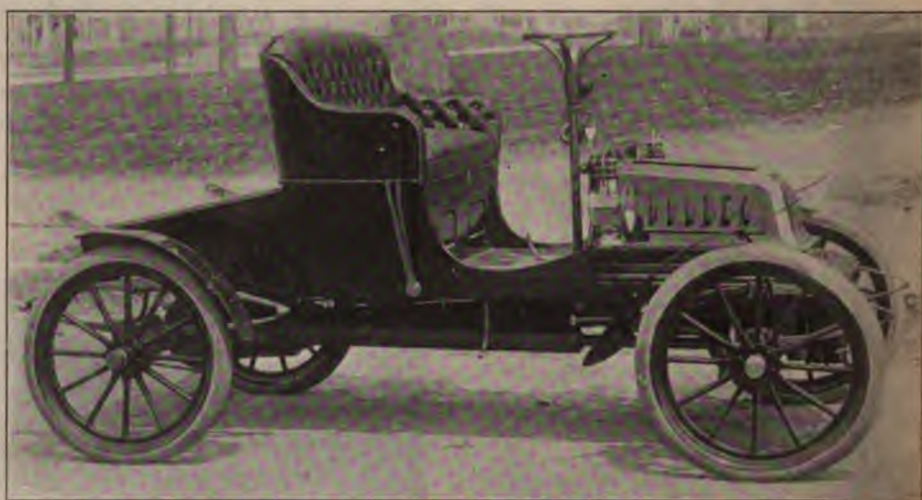
The running gear is of tubular construction, and has a pivot joint at the centre of the front axle. The weight of the wagon, with 50 gallons of water and 18 gallons of gasoline, sufficient for a run of 50 miles, is 4,500 pounds. The maximum speed on average road is claimed to be 12 miles per hour. One of the features of the car is a patented kerosene burner.



RUNNING GEAR OF "EMPIRE" STEAM DELIVERY WAGON.

The Phelps Touring Car.

A gasoline touring car embodying a considerable number of novel features is built by the Phelps Motor Vehicle Company, of Stoneham, Mass., and shown in the illustrations herewith. The car is equipped with a three cylinder vertical engine, which is located in front under a bonnet. The cylinders are of 4½ inches bore and 4½ inches piston stroke, and the engine develops 15 horse power at 900 revolutions per minute, and weighs 235 pounds, including the flywheel. It is fitted with primary electric or contact spark ignition, the current being furnished by a battery. The sparking points may be withdrawn in a moment and replaced, or a new one substituted, with equal facility. The sparking points should wear for several hundred miles, and extra points are furnished owners of the car at a low price by the manufacturers.



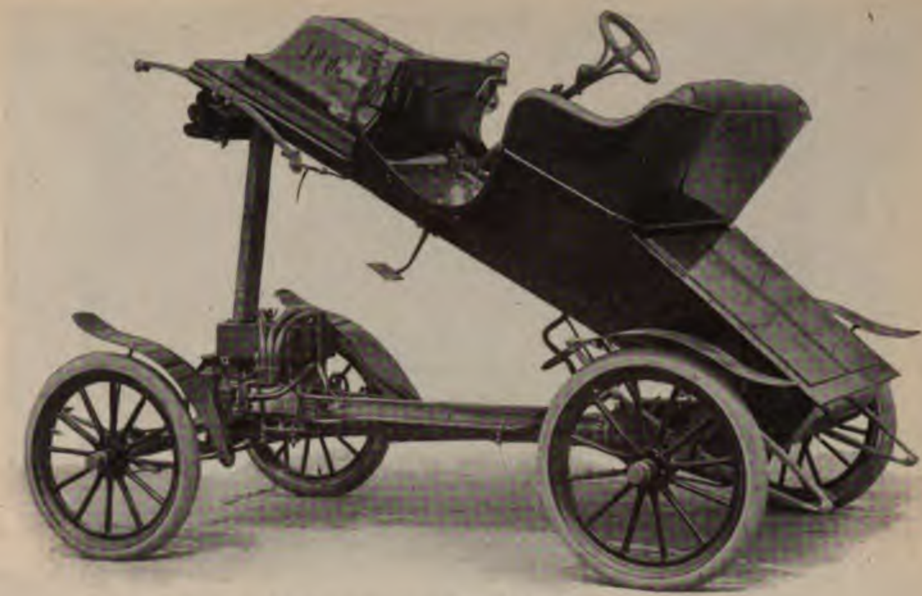
PHELPS GASOLINE TOURING CAR, SHOWING STEERING POST MOVED OUT OF THE WAY.

The engine has splash lubrication and speed control by charge throttling. The cooling water is circulated by means of a gear driven centrifugal pump through a radiator, one-third of which is located in front of the engine below the body and the other two-thirds encircling the body underneath the floor. It is claimed that by thus arranging the radiator in parts 25 per cent. more cooling capacity is obtained than if the same length of tube was arranged compactly.

The engine crank case is made in a single piece and a connecting case runs from the crank case to the differential gear case on the rear axle, this connecting case enclosing the change gear. The engine is supported by a transverse semi-elliptic spring above the front axle, as plainly shown in the illustration of the engine herewith, and the suspension of the engine is therefore entirely independent of the body suspension. The engine is also rigidly supported upon the rear axle through the differential gear and change gear cases. By this arrangement the engine is loaded with more than twice its own weight of dead metal, hindering its free vibration.

The drive is by bevel gear direct to the rear axle, and the change gear gives two forward speeds and one reverse. The axles are mounted in roller bearings, and the wheels are of the artillery type and fitted with 3 inch single tube or clincher tires at option. The wheel base is 78 inches and the tread 54 inches. The body is supported by full elliptic springs both in front and rear, the running gear being of reachless construction. The body is pivoted on the rear axle and the front end may be raised without detaching water pipes, clutch or brake cables, this operation requiring only about four minutes' time, it is claimed. The raising of the front part of the body, as shown in our illustration, can be done anywhere, and makes all parts perfectly accessible. Auxiliary springs are provided for use when four passengers are carried, and to be removed when only two passengers occupy the seats. In this manner the car has a comfortable spring action under all conditions of load, and the time to attach and detach the springs is said to be only about two minutes.

The steering is by an inclined hand wheel, and the steering post is pivoted at the base to permit easy ingress and egress. The throttle lever is arranged at the centre of the steering wheel. The flywheel has fan shaped arms, which force a constant current of air over the engine, thus keeping it cool and clean. The gasoline tank, which is located back of the front seat, has a capacity of 8 gallons. The water tank also has a capacity of 8 gallons, and the range of travel on one charge of supplies is stated to be 200 miles. The car, ready for the road, weighs 1,400 pounds, and is said to have a speed capacity as high as 40 miles per hour. A large muffler, 4 feet 6 inches long and 3½ inches in diameter, is provided and effectually takes care of the engine exhaust. The problem of lubrication has been thoroughly worked out, and oil needs to be fed in two places only to insure all parts of the driving mechanism being supplied. The special feature of the car is that none of the driving machinery is attached to the body, and that the occupants therefore do not feel the vibration of the engine. The general outline of the car is similar to that of a number of recent American touring cars.

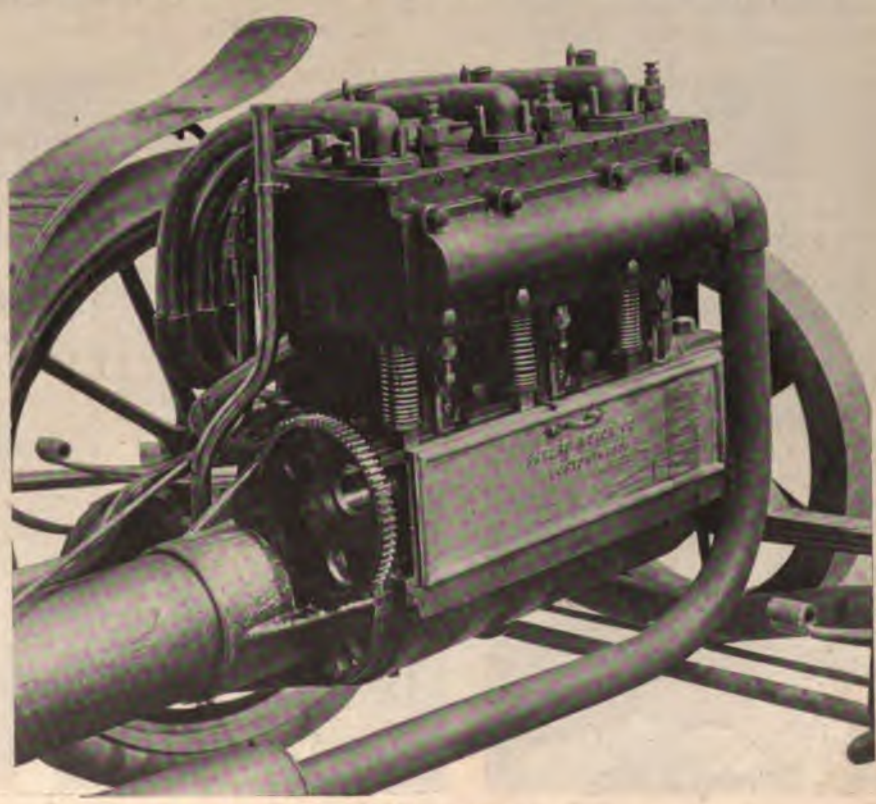


PHELPS CAR WITH FRONT PART OF BODY RAISED.

The Zentmobile.

The Single Center Buggy Company, of Evansville, Ind., are the manufacturers of the 8 horse power gasoline touring car herewith illustrated. This car has a 2 inch angle iron frame which is welded at the four corners. The engine is of the single cylinder, horizontal type, and is located in the rear of the body, being bolted to the frame. It is fitted with jump spark ignition. Two sets of dry cells are provided, located in a box attached to the rear part of the frame, as plainly seen in the top view of the chassis. These batteries are, of course, interchangeable. The carburetor which feeds the engine is of the float feed variety, and is made entirely of aluminum. It is of such design as to not require shutting off, the stopping of the engine automatically cutting off the gasoline supply. The muffler, which is located just back of the front axle, is claimed to be very efficient in deadening the noise of exhaust, and in order that it may not unduly reduce the engine power while running in the country and away from traffic a cutout is provided, which relieves all back pressure.

The transmission gear is of the sun and planet type, giving the usual two forward speeds and reverse. The range of forward speeds is said to be from 4 to 35 miles per hour. Transmission to the rear axle is ef-



ENGINE OF PHELPS TOURING CAR.

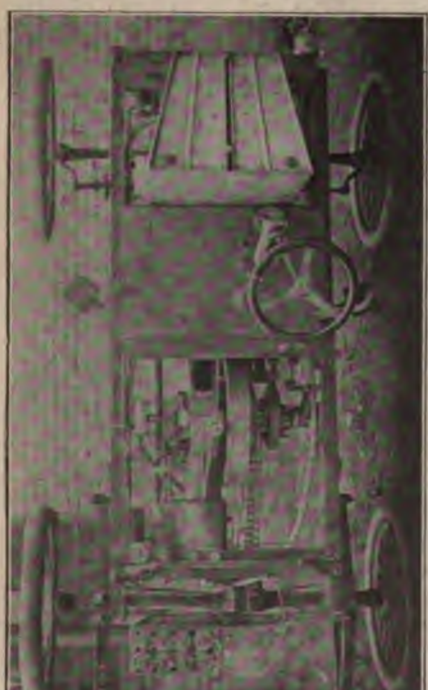
Eight Horse Power Zentmobile.

fected by means of a 1¼ inch pitch Diamond roller chain. The compensating gear and sprocket on the rear axle are encased, and are fitted with a powerful, double acting brake. It is claimed that all the machine parts are made either of steel forgings or phosphor bronze. The steering is by means of hand wheel, but a lever will be fitted if desired, we understand.

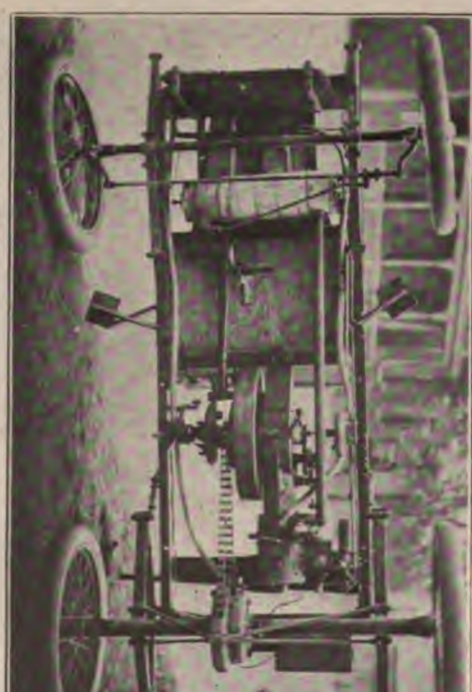
The front axle is of 1¼ inch diameter, and is fitted with ball bearings. The rear axle is 1⅜ inches in diameter, encased in steel tubes, and runs in four sets of roller bearings. The car here shown is fitted with wire wheels of 30 inches diameter, and with 3 inch double tube tires. Wood artillery wheels will, however, be fitted at option. The gasoline and water tanks are located in front under the hood, where they are out of the way and where there is no danger of their being damaged. The car is fitted with either a single seat touring body or with a tonneau. In either case the body can be taken off from the frame by loosening six nuts without disturbing any of the levers or ignition wire.

The company inform us that they manufacture all parts of the mechanism themselves, and the machine is, therefore, not one of the class that are assembled from parts manufactured by different concerns.

Goodyear Flat Tread Tire.



Top View.



Bottom View.

Zentmobile Chassis.

A New Carlisle & Finch Ignition Generator.

We illustrate herewith a new form of dynamo igniter which possesses a number of novel features. The dynamo proper is entirely enclosed and has its field coils, armature and commutator completely protected from the water and mud. The brush holders are of the radial type and are attached to the outside of the casing so that the brushes may be removed for examination or inspection without loosening any screws, it being only necessary to pull out the small brass finger which holds the brushes in position. This dynamo may be driven by a belt or friction pulley. It is suspended in a cradle casting, which permits of its being rocked from side to side, thus providing an ample movement for adjusting the belt or friction pulley. The machine is of neat design, compact and of light weight. It will operate a make and break spark or a jump spark. The manufacturers are the Carlisle & Finch Company, 225 East Clifton avenue, Cincinnati, Ohio.

C. & F. Ignition Generator.

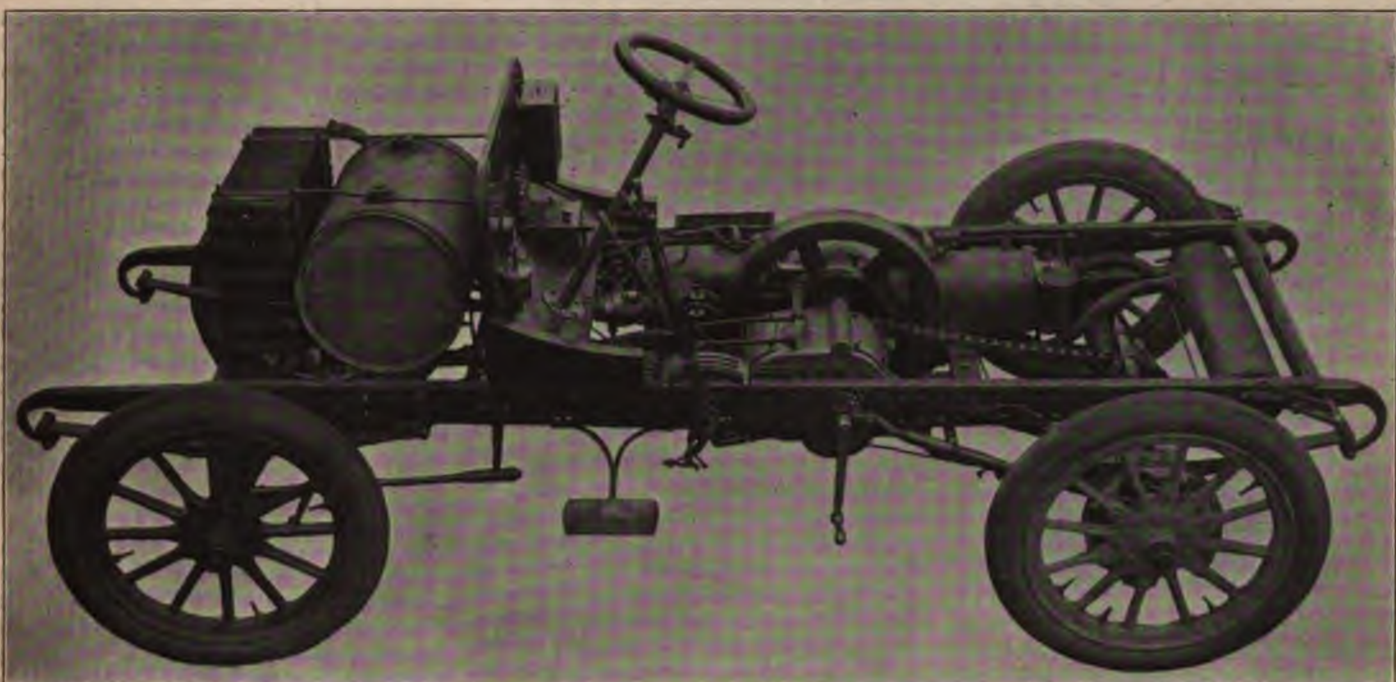
New Goodyear Tire.

The Goodyear Tire and Rubber Company, Akron, Ohio, has just brought out a new double tube clincher tire with flat, grooved tread, as shown in the sketch herewith. The object of this form of tread is to prevent skidding. With a tread of this form the contact surface on the ground remains constant for all variations of load. The outer cover of this tire is held in place on the rim by threaded lugs and the inner tube is protected by flaps.

The New Stearns Touring Car.

We show herewith a general view of the new 23 horse power gasoline touring car made by the F. B. Stearns Company, Cleveland, Ohio, and also a view of the chassis of the car. This car is propelled by a double opposed cylinder motor, the speed of which is controlled by throttling the charge. The transmission gear is of the sun and planet type and gives three forward speeds. The friction clutch is of an outside band type and is easily adjusted, while at the same time it avoids all end thrust on the bearings. The circulating water is cooled by a small tube radiator located in front. Behind this radiator, under the rectangular sheet metal bonnet, is located a large size water tank. Both the water and gasoline tanks are claimed to have a capacity sufficient for a 200 mile run.

Stearns Twenty-five Horse Power Touring Car.



Chassis of Stearns Touring Car.

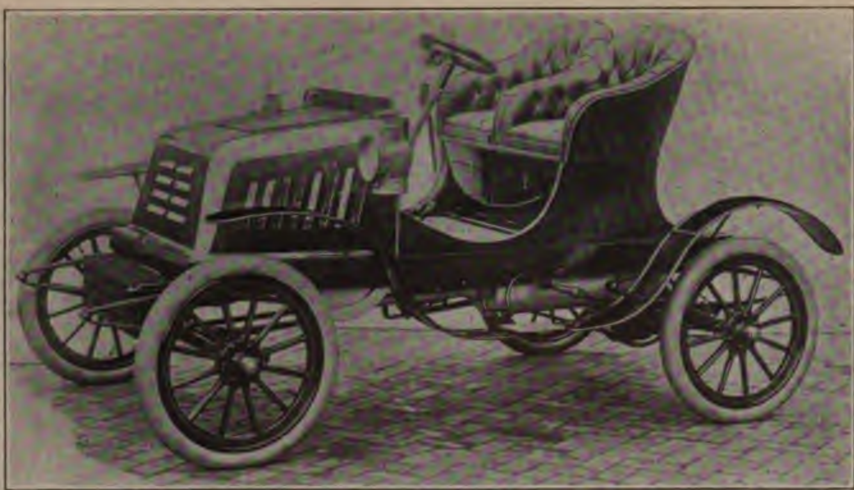
The running gear frame is built up of armored wood and the car has an 8 foot wheel base and 24 inch artillery wood wheels. The body is supported on 40 inch semi-elliptic springs and comprises a divided front seat and a tonneau with room for four passengers. The lubricating attachments, coils, etc., are arranged on the dash and the ignition battery is located at the side of the frame. The car is built for control from the left hand side and all the controlling levers are compactly arranged.

The Iroquois Touring Car.

The J. S. Leggett Manufacturing Company, of Syracuse, N. Y., are building a four cylinder gasoline touring car weighing 1,650 pounds, and 1,500 pounds with tonneau removed. The engine is of upright construction, water cooled and placed under a bonnet in front. The ignition is by jump spark, four separate coils being used and current furnished by a dynamo.

Iroquois Tonneau Car.

The power is transmitted to a countershaft by means of a chain and the speed



Iroquois Single Seat Car.

varied by means of a planetary transmission giving two forward speeds and one reverse and being controlled by a single lever.

The running gear frame is built up of sectional steel, reinforced with angle irons.

The Auto-Igniter.

The car has a double truss rear axle and is fitted with wood artillery wheels, with detachable tires. It is fitted with wheel steering and with a double acting brake. The body and bonnet are designed on French lines, and when the tonneau is removed a very graceful single seat car is obtained with ample space in the rear for touring baskets. The wheel base is 78 inches and the tread standard.

The water cooling system includes a radiating coil, dropped below the frame in front, and a rotary circulating pump, driven by gear from the motor. The engine cylinders are automatically lubricated. An electric battery used for starting is automatically recharged from the dynamo while the car is running. The car is claimed to be of elegant and elaborate finish and is provided with grain leather covered wheel guards, hand stitched.

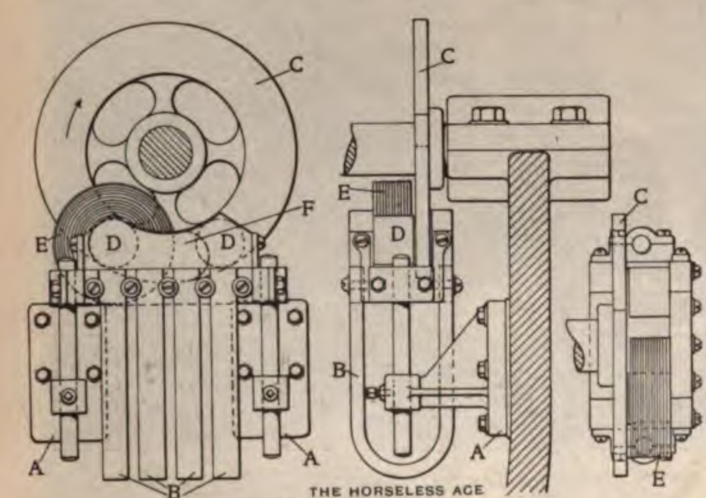
The Auto-Igniter.

A very simple mechanical generator for electric ignition of explosive engines is marketed by the Auto-Igniter Company, of 161 Washington street, New York city. It consists of an iron disk fixed to the engine shaft, either on the end of same or on the inside end of the hub. This disk revolves, without touching, between the two pole pieces of a powerful compound permanent magnet fastened to the frame or base of the engine. A coil of wire is wound upon one of the pole pieces. The disk has a portion of its surface cut away, so that when rotating between the poles of the magnet system a change in the magnetic flux is produced when this portion passes the poles. The change in the magnetism produces an electric current in the coil which will ignite the charge in the engine, but which is not sufficient to burn the ignition points.

At 200 revolutions this machine will give 12 volts.

For contact or hammer break ignition one terminal of this coil is grounded to the frame of the engine, and the other is connected to the terminal of the insulated electrode. No spark coil is used and a powerful spark can be obtained at the spark terminals for about 45 degrees of every revolution; the spark is said to be equal to that obtained from six good cells of battery with spark coil, and the range of 45 degrees is sufficient for any engine requiring no more than one explosion for each revolution of the engine shaft. When more explosions are needed, as in some multicylinder engines, the disk is suitably cut away in two or three places instead of only in one place.

The direction of the current when the circuit is closed within the cylinder is such as to strengthen the permanent magnets. Actual measurements made on magnets taken from machines that had been in use for some time are said to have proved this to be so. This is an extremely important feature, as it insures the permanency of the machines and prevents them from weakening with age, as is so often the case with magneto machines of other types.



The Auto-Igniter.

A, bracket; B, permanent field magnet; C, revolving iron disk; D, field poles; E, coil; F, cutaway section of disk.

The "Technolexicon."

In the beginning of 1901 the Society of German Engineers (Verein Deutscher Ingenieure) began the compilation of a universal technical dictionary in the three languages, English, German and French. This undertaking has met with general approval and has received assistance from all quarters at home and abroad. Up to now (May, 1903) there are 341 societies (42 in English, 272 in German and 27 in French speaking countries) co-operating in the work, either by the systematic collection of technical expressions of the specialties represented by them or in other ways, especially by the acquisition of collaborators and by placing technical publications in more than one language at the disposal of the Verein, as catalogues of firms, inventories, price lists of machines, handbooks, etc. Through these societies the Technolexicon has found helpers in Great Britain, Germany, France, the United States, Austria, South Africa, India, Australia, Belgium, Canada, etc.

As the contributions will not be called in before 1904 all who wish to help in the compilation of the Technolexicon have still time and opportunity to assist in the preparation of their specialties. Contributions from all technical branches (including the handicrafts) are welcome.

The work is in charge of Dr. Hubert Jansen, Berlin (N. W. 7), Dorotheenstrasse 49.

In a motor cycle race at Bristol, England, on Saturday, May 22, two competing machines running abreast of each other hooked together and ran into the crowd of spectators at 40 miles an hour. Ten of the spectators were more or less seriously injured, and four were carried away unconscious.

COMMUNICATIONS.

The Effect of the Bailey Law.

Editor HORSELESS AGE:

In your last issue W. W. Niles is of the opinion that the new New York law will not deter people from buying automobiles. We have several expressions from proposed buyers that indicate a different feeling, and we therefore know that Mr. Niles is wrong in his opinion. A fair sample is as follows:

"KENWOOD, N. Y., May 29.

"Your favor of the 27th is received, and in reply I would say that when I wrote to you a letter of inquiry I was intending to buy an automobile. Since then the Legislature of this State has passed a law so destructive to all pleasure or comfort in automobiling that I have decided not to buy an automobile until the law is either repealed or greatly modified, or until I move to another State."

Facts like this tell the story.

DURYEA POWER COMPANY.

Will Steam Carriages Explode?

Editor HORSELESS AGE:

I enclose a clipping taken from a recent number of the New York *Medical Journal*, and I desire to obtain from you some information in regard to the possibility of the explosion of steam automobiles. I infer that the automobile of Dr. Blaisdell was a "steamer," and as there seems to be a difference of opinion among local machinists as to the possibility of such an accident happening to a properly constructed automobile I would like to see your views about the matter.

Is such an accident at all likely to occur, and if so under what circumstances? I have always understood and maintained that it was impossible for a steam vehicle to explode, but the item referred to has shaken my faith somewhat, and at present I do not feel altogether safe while sitting over a boiler containing 250 pounds of steam. If there be just one chance in the thousand of an explosion I think it would be supreme folly for anyone to operate a steam automobile.

ROBERT W. GIBBES, M. D.

[When the accident referred to was reported in the papers a representative of THE HORSELESS AGE called on the owner of the machine. Dr. Blaisdell made very light of it, and said that the total damage did not amount to $20. It had simply been a fire, and had been due to the negligence of the chauffeur.

There has never yet been a boiler explosion of steam carriages of the standard runabout type, as far as we are aware. Such explosions are frequently reported in the papers, but they are usually nothing more or less than a gasoline fire caused either by a leak in the gasoline system or by carelessness of the operator in allowing the steam pressure to get too low and thereby flooding the burner with unvaporized gasoline.

The only real explosions on steam machines which have come to our notice have been explosions of the air tanks. The air in these tanks may under conditions absorb just enough gasoline vapor from the gasoline tank to form an explosive mixture. To cause an explosion this mixture must be ignited in some manner.

We are not in position to state that it is absolutely impossible for automobile boilers of the fire tube type to explode, but the very fact that such an explosion has not yet occurred after the machines have been in use in large numbers for four years, by all kinds of inexperienced persons, proves that the possibility, if it exists, is practically negligible.—ED.]

Want to Bar Automobiles.

Editor HORSELESS AGE:

There is a petition being circulated in the town of Meredith, N. H., 9 miles from here, to prohibit the running of automobiles in that town. There has been no accident there caused by an auto to my knowledge, but they wish to stop what they term the "hellish" work of automobilists. I have not as yet heard the result of their petition, and I don't know of any law that would legalize such action. If a person were taking a trip through the country and should see a sign prohibiting him from passing through this town, I do not see how they could compel him to make a circuit of 15 or 20 miles that he might not run across the town where these narrow minded people live. This letter will show you what a person has to contend with besides bad roads.

L. G. FIFIELD.

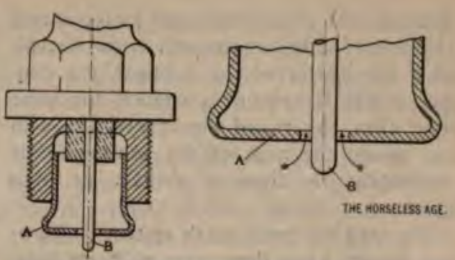
[No town can legally bar automobiles from its streets, as judicial opinion has been rendered time and again that they have as much right upon the highway as any other class of vehicles. Sentences imposed under any ordinance prohibiting the use of automobiles on the streets would not be sustained by the higher courts. However, with no State law to define the limits of power of the local authorities in this matter, and with the automobilist fighting single handed against the community, he may be subjected to a great deal of trouble. The incident shows the value of a sane and reasonable State law.—ED.]

A Sootproof Spark Plug—Motor Car Wanted.

CHRISTIANIA, May 7.

Editor HORSELESS AGE:

I am sending you herewith a sketch of a new sparking plug which I have tried for some time with excellent results. As seen from the sketches, the spark is produced between the disk (cap) A and the pin B. The cap A can be bought separately



SOOTPROOF PLUG.

very cheaply, and can be placed on every standard plug. The spark gap remains perfectly constant in every case, and the cap prevents sooting of the whole device.

At the same time I would like to inquire if you could name me a maker of self propelled vehicles for running on rails and carrying forty to fifty passengers, that is, a tramlike car with flanged wheels, with 40 to 50 horse power motors and with two compartments. I have also inquiries for motor trolleys. These are now bought from Germany, and I should prefer to import American manufactures, as in this branch they are generally better than any others.

Couldn't you state through your journal the cost of postage to Europe? I receive letters daily on which I must pay double the ordinary postage.

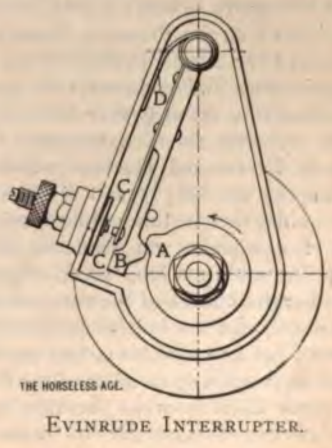
F. HIORTH.

The Evinrude Mechanical Interrupter.

Editor HORSELESS AGE:

Referring to your recent description of our mechanical interrupter, on page 604 of your issue of May 20, we herewith enclose a blue print of the device, the method of operation of which is as follows:

When the cam A on the secondary shaft rotates it strikes the hammer B, and thereby brings the two platinum points C C in contact. When the raised portion of the cam has passed the nose of the hammer B, the spring D, near the hinge of the hammer, separates the contact points and causes the spark in the secondary circuit. When the motor is running slowly the hammer will follow the cam surface and produce a contact the length of which is determined by the length of the raised portion of the cam. When the engine runs at high speed the raised portion of the cam strikes the



EVINRUDE INTERRUPTER.

hammer with great force, and as the spring D is not of sufficient strength to counterbalance the inertia of the hammer, the contact points C remain in contact for some time after the raised portion of the cam has passed the nose of the hammer, thus prolonging the time of contact at high speed.

We used the jump spark system on gasoline motors when there were no parts to be had on the American market in the line of coils, and made our own spark plugs, and in those early days we used ordinary laboratory coil. Since then we have experimented with many different interrupters, and have tried almost everything that has come to our notice. The one here described we have had in use for about a year and a half, and it has given perfect satisfaction, and has proven to lead to considerable saving in battery power.

MOTOR CAR POWER EQUIPMENT CO.

Commercial Traveler Will Use a Touring Car.

Editor HORSELESS AGE:

Last year I ran an automobile in making my trip through Southern Minnesota and Northern Iowa. The roads were very bad, but I got over them just the same. This year I am going out again, but you bet with a heavier machine. Last year I ran a steamer, but this year I am going to run a 20 horse power gasoline car. This has proven to me the only car that will do for a traveling man to try to make his trip with. Plenty of the boys want to make their trips on an auto, but I want to tell them not to expect a $1,000 or $1,500 car to do the work, because it will not stand the work. I have been there and I know all about it. These light 10 horse power cars will never do for that kind of use, but the big touring car will.

GEORGE A. MCLEAN.

The Bronx A. C.'s Part in the Arrangements for the Automobile Trip of the Congressional Committee on Rivers and Harbors.

Editor HORSELESS AGE:

In the June 3 issue of THE HORSELESS AGE you published an article on page 654, headed "Property Owners Thank Automobilists," in which the Property Owners' Association of the Bronx publicly thank several individuals and companies for gratuitously supplying about twenty-five automobiles to transport the Congressional Committee on Rivers and Harbors which visited this city on May 5 and 6. It seems rather unjust that in this public resolution no word of thanks was tendered to the Bronx Automobile Club, which organization had entire charge of the run, and upon whom devolved the whole responsibility of procuring the automobiles to transport the Congressmen. Every member of the Bronx Automobile Club, from the president down, worked very energetically to make the thing a success, and the club furnished and secured fully 75 per cent. of the cars that were used on the run to Woodmansten Inn. While the club is not looking for any unmerited praise, the writer certainly thinks that credit should be given where it is due; and I hereby take this method of informing you of the true facts of the case.

J. STUART BLACKTON.

Patents in Australia.

MELBOURNE, April 30.

Editor HORSELESS AGE:

All those interested in Australian patent applications may be concerned in knowing that a new act came into force in Victoria on April 6. Under this there is to be no search made by the Government as to the novelty of provisional applications. In the past the investigations by the examiners against provisional applications was as severe as against completes, and drawings were therefore frequently called for. This will no longer be the case, much to the relief of the inventor. But the passing of this act by the State Government shows that the prospects of introducing a federal patent act would at the present appear to be somewhat remote.

PHILLIPS, ORMONDE & CO.

Obituary.

JOHN L. FRENCH.

John L. French, president of the St. Louis Motor Carriage Company and one of

JOHN L. FRENCH.

the pioneers of the American automobile industry, died at his home, St. Louis, Mo., from the after effects of an accident he met with at Pittsburg last summer. Mr. French was a man of very genial disposition and his death before the prime of life will be mourned by many friends and acquaintances in the trade.

He was born in Nashville, Tenn., November 10, 1872, and was educated as a mechanical engineer at the Washington University, St. Louis. After graduating he entered the Jesse French Piano and Organ Company, of Nashville, finally becoming secretary of that firm. While occupying this position he and a school friend, Preston Dorris, built a gasoline automobile together in 1895 or 1896. Mr. French's family later removed from Nashville to St. Louis, and the work on the automobile was there completed, Mr. Dorris also having gone to St. Louis. In 1898 the St. Louis Motor Carriage Company was organized, with John L. French, president; Mr. Dorris, vice president, and H. E. French, secretary and treasurer. A small building was erected at first, but it was not long before they found their quarters too small and built an addition seven times as large as the original building.

Mr. French made several extended tours in his automobile to various parts of the country. His first long trip was from St. Louis to Chicago on the occasion of the *Inter-Ocean* tournament in the latter city in the fall of 1900, and while there he carried off three prizes. Then he ran a machine in the New York-Buffalo Endurance contest, in the fall of 1901, and at the completion of this trial he made an extensive tour in New England with the same machine. His last long trip was made in company with his wife from St. Louis to Florida last winter, which he accomplished successfully in spite of the bad roads, mountains and other obstacles.

While in Pittsburg, about nine months ago, Mr. French's machine was struck by a street car and he was thrown out. At first he recovered quite satisfactorily and the trip South was made, but internal injuries developed and about three months ago he began to fail and on May 23 the end came.

Trade Literature Received.

The New Process Raw Hide Company, of Syracuse, N. Y.—A pamphlet on the noiseless raw hide gears and pinions of the company.

Frederick Jessett, 2 Staple Inn, London, England.—Floor plan and terms of "Motoria," the universal automobile mart, Olympia, Kensington, London, W.

The Pennsylvania Steel Company, Steelton, Pa.—From Steelton to Mandalay, a short description and pictorial history of the construction of the Gokteik (Upper Burma) viaduct, built by the Pennsylvania Steel Company in their bridge works at Steelton, Pa., U. S. A.

The Cincinnati Milling Machine Company, of Cincinnati, Ohio.—"Examples of Rapid Milling," showing methods of machining different pieces of work to best advantage on the milling machine.

The Monarch.—C. G. Norton, 436 Jefferson street, Milwaukee, Wis.

J. Stevens Arms and Tool Company, Chicopee Falls, Mass.—"How to Operate a Stevens-Duryea Gasoline Carriage." An elaborate instruction book with diagrams and half-tone engravings of parts.

The Auto-Supply Company, Inc., 310-314 Mott street, New York city.—Automobile parts.

The Duryea Cars.

(Continued.)

THE IGNITION SYSTEM.

The sparking system is make and break, using a low tension current generated ordinarily by magneto. This current is carried to the engine by a bare wire attached to an insulated stem by a spring clip, which is caused by vibration to grip tighter, thus insuring a constant contact, yet instantly removable for testing or other purposes by springing the ends of the clip together. This insulated stem has a flange around its middle, on both sides of which ordinary mica washers are placed. A metal union nut or cap binds the mica washers and the stem to the base of the plug, which in turn screws into the cylinder wall, allowing the end of the plug to project inside. This end is tipped with a ring of nickel alloy, which is claimed to resist both heat and corrosion better than other metals, and can be turned around when worn. The mica insulation is not exposed to soot, oil and burned gases, and is said to keep clean for hundreds or even thousands of miles. The union nut or cap can be unscrewed quickly, exposing the mica and permitting the dirty one to be removed, the number of micas being sufficient to permit such cleaning several times before new washers are needed. Through the hollow exhaust valve stem a sparker stem is inserted having conical ground joints in the exhaust valve seat, and with bent point or arm nickel tipped and adapted to contact against the insulated nickel ring. The projecting outer end of this sparker stem is provided with a hammer, spring and clamp, the latter being held by a set screw firmly on the stem. A flat lift raised by a roller on the exhaust cam raises the hammer and permits it to drop suddenly under the action of the spring, causing it to strike the clamp and knocking the sparker point out of engagement until the lift is again operated. The exhaust cam pushes the exhaust valve with the sparker parts out of the way, so that the lift may return to its original position, ready to repeat the operation. This mechanism is quite simple and is located on top of the motor in a most accessible position.

WIRING SYSTEM.

The diagram (Fig. 8) illustrates the wiring of the magneto M and the battery B, each having one pole grounded and the other connected running to the switches, where the spring contact arm maintains a connection with the magneto wire unless caused to engage the battery by being pushed over. From the spring arm a single wire leading to the coil C and thence to the three insulated plugs P completes the circuit. This extreme simplicity, with freedom from binding screws, is claimed to render the electric part very reliable. Special spring clips D attach the wire to the plugs without nuts or screws.

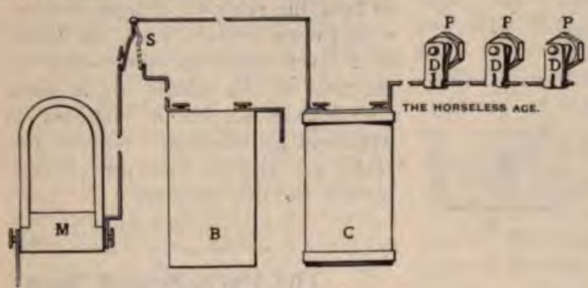


Fig. 8—Wiring System.

MIXER.

At the rear lower corner of the fuel tank (A, Fig. 9) a casting B is attached to the under side, providing a sort of pit into which any water will fall, and since the float chamber C holds but a few drops at a time, the presence of water in the gasoline will be made known instantly by the action of the motor. In this event the bottom D of the float chamber may be unscrewed, dropping out the float E and the gasoline and water contained in the float chamber. The pet cock F at the bottom of the well may be opened in such a case. These parts may be reached by putting the arm under the vehicle from either side while looking down from above.

The float is a one piece affair, having a conical point G on top which closes the small opening through which the gasoline enters. For constant level this point should be blunt, but for varying the level the point should be sharp and long, which necessitates the gasoline level being considerably dropped before the opening has fully opened. By this means a rich mixture is assured at slow speeds and excess avoided at high speeds, for at high speeds the gasoline level in the float chamber is decidedly lower than at low speeds, which simple device secures satisfactory results with freedom from complication.

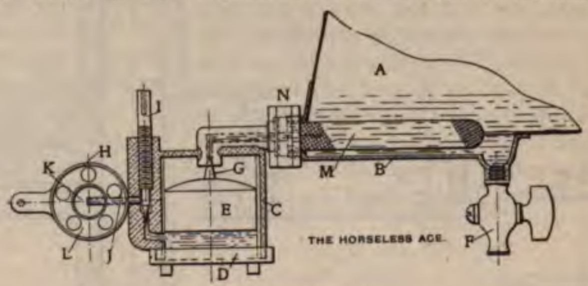


Fig. 9—Carburetor.

The passage from the float chamber C to the air pipe H is controlled by a needle I operated through a flexible wire from a handle at the front edge of the cushions, thus avoiding flexible joints with their additional cost and lost motion. A small spray tube J passes to the centre of a small air tube K concentric with the large one, while a diaphragm L is provided that closes or opens the major portion of the surrounding space. This diaphragm is closed for starting, for running in extremely cold weather or for very slow speeds, and is opened with proportionate gasoline needle adjustment when high speeds are wanted. It secures, therefore, a wide range of operation from a very simple apparatus.

The inlet to the float chamber, as well as the filling opening of the tank, is guarded by a liberal gauze screen M fine enough to catch the lint and dirt inseparable from commercial gasoline. The size of the gauze is a particular safeguard against frequent clogging, lint having been known to stop a gauze as large as a cent piece in 300 miles. A union nut N connects the mixer with the tank, but since the parts of the mixer may be removed without detaching from the tank, no stop cock, with its additional joints, its necessary.

THE CONTROLLING LEVER.

The controlling lever (Fig. 10) consists of a casting A A pivoted at the forward edge of the seat to swing sidewise. It has oppositely projecting arms below the seat to which the tensile steering connections B B are attached, while upward and slightly forward the tube or lever proper C projects. Bushings D D at each end support a smaller tube E within the main tube, which smaller tube slides up or down and carries at its lower end a a long pinion F. This pinion engages (substantially in the axis of the pivot) a rack G having diamond shaped teeth which permit the lever

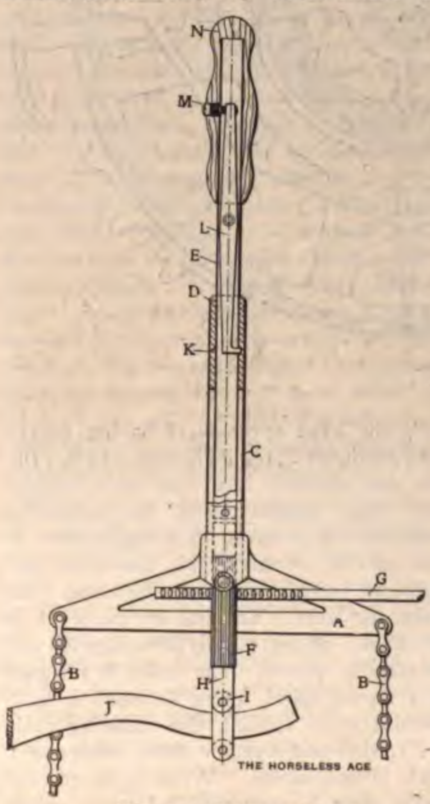


Fig. 10—Control Lever.

to be swung to the extremity of its motion in either direction without damaging the teeth of the rack and permitting the rack to be operated by rotating the pinion F in any position. This rack is attached near the right hand side of the wagon to one end of a lever. pivoted to the side of the wagon, while the other end of the lever operates the throttle slide. This pinion is bored out, and in it is swiveled a stud H carrying rollers S S, which engage the shifting lever J so that sliding the internal tube E up or down carries the shifting lever J up or down with it, and permits setting the clutches, while in no way interfering with either the steering or the throttling. The end of the shifting lever is bent to the arc described by the rollers in their normal working position, and any slight variations are readily provided for by the hand of the operator. The upper bushing D on the steering lever is provided with an internal groove K, while the internal tube has in it a lever L with a projecting end adapted to engage this groove and lock the tube E in the middle position with clutches off. By pressing the safety button M in the handle N this catch may be disengaged to permit setting either the high or low speed clutches. Wooden handles of various lengths are provided giving a length of steering lever to suit the purchaser.

BALANCE GEAR (FIG. 11).

A one piece rear axle A is keyed to the right hind wheel and to a 6 inch bevel gear B near the left hand side of the vehicle. It extends with slightly reduced section through a sleeve C and gear D, and terminates in a nut outside the left hand wheel, which nut holds both the wheel and the sleeve with its large bevel gear in position. A four armed spider E is journaled on the inner end of this sleeve, and carries four bevel pinions F which complete the balance gear nest. The studs G of this spider likewise carry the large sprocket H having thirty-three teeth for a $1\frac{3}{8}$ inch pitch chain. Inside this sprocket is a face seven-eighths inch wide, against which an expanding brake band I is forced by a toggle lever J. One part K of this toggle has screw adjustment which permits adjusting the brake for wear. The end of the lever is arc shaped, giving a most advantageous application of power. The brake is released by a strong spiral spring L which is least effective when applied, thus insuring positive release and freedom from unnecessary work in application. When released the brake band is supported by seven points M, which insure that it does not clear excessively at some points and rub at others. These points form part of a spider N into one end of which (at O) the chain adjusting rod is screwed. Two of these points pass into the eyes R attached to the brake band, and take the strain when the brake is applied. These eyes are so placed that one receives the strain due to a forward direction and the other due to a reverse, while in each instance the friction of three-quarters of the band tends to cause the band to grip tighter, the remaining one-quarter not having this tendency. By this arrangement the brake is almost self applying in either direction, and in connection with its large size makes it very easy to hold the vehicle. A light flexible piano wire passes forward from the brake lever to a lever projecting downward through the floor of the vehicle. It is made light and flexible, so that it may not be deteriorated by vibration. Heavier rods and cables are said to have proven less satisfactory for this purpose.

(To be continued.)

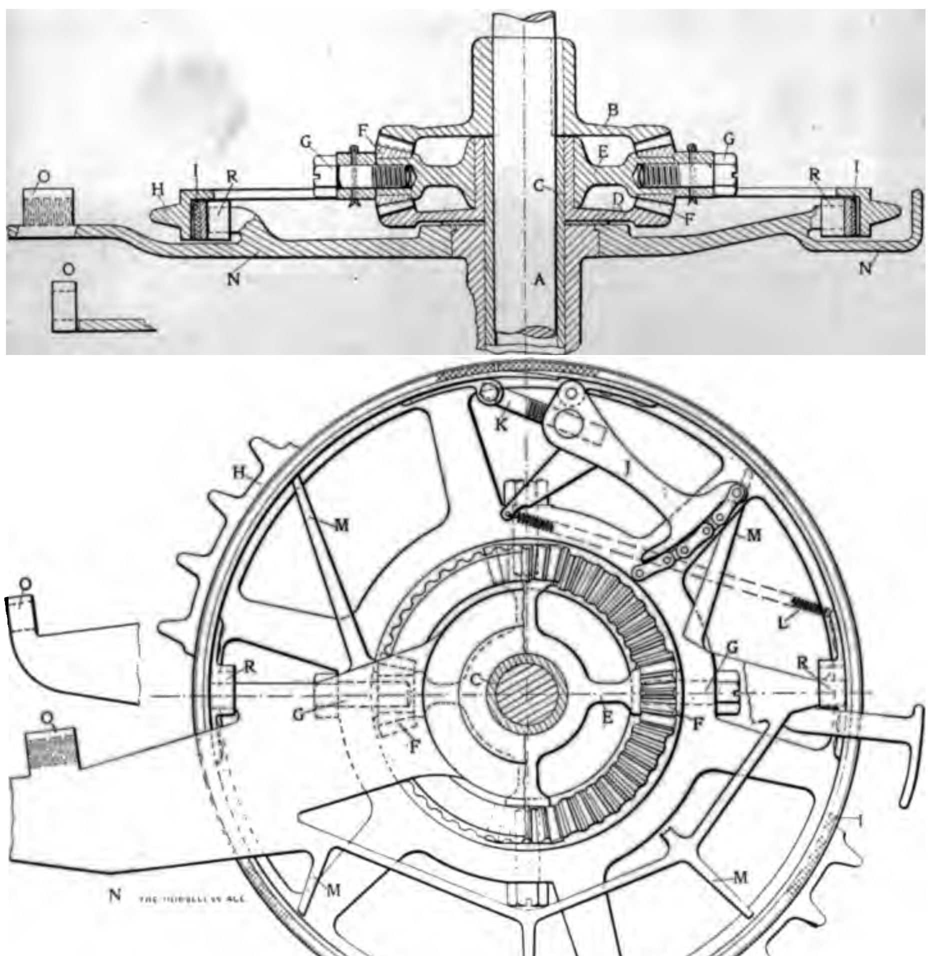


FIG. 11.

The Paris-Madrid Race.

Very elaborate preparations had been made for the Paris-Madrid race, at the Spanish as well as at the French end, and the interest of the public in the event, particularly in Paris, was unprecedented. The Spanish Government had afforded every aid to the Royal Automobile Club, and the Spanish Red Cross Society had arranged with its provincial branches to have in readiness, during several days and nights, twenty-six well equipped ambulances, distributed along the route at the places most convenient. An extensive program of festivities had been arranged to take place at Madrid at the conclusion of the races, and the King of Spain had promised his presence at some of them.

The race was to be run in three stages: Paris-Bordeaux (343 miles) on Sunday, May 24; Bordeaux-Vittoria (208 miles) on Tuesday, May 26, and Vittoria-Madrid (256 miles) on Wednesday, May 27. This allowed one day's rest after the first stage.

PRELIMINARIES.

The cars to compete began to arrive in Paris on Monday, May 18, and on Tuesday the weighing, stamping, sealing, etc., began in the Tuileries Garden. The Place de la Concorde, in front of the headquarters of the A. C. F., and the western end of the Champs Elysées were crowded with the racing monsters all the rest of the week.

Great attention was paid by the A. C. officials to weight, for makers, in their desire to increase the power of their engines, had run the margin very fine, and many of the vehicles only qualified for their respective categories with a few ounces to spare.

THE START.

The start for the race Sunday mon

at Versailles. During the whole ioon and evening on Saturday the from Paris to Versailles, through the de Boulogne, Suresnes, Ville d'Avry, the Côte-de-Picardie was thronged an uninterrupted stream of cycles, au-biles, cabs and carriages, all wending way to Versailles.

ie city of the Grand Roi, the great ues of which are generally so silent, brilliant with light and animation dur-he whole night. At 3:30 in the morn-an immense throng literally camped around the lake known as the Piece u des Suisses. Rugs were thrown on ground, and thousands of people pic-:d, or, lying down, sought to get a lit-est. Other thousands remained in autos and carriages patiently await-the arrival of the motor cars which to go to Madrid. Meantime 400 ers of the Engineering Corps kept the clear for the competing automobiles. weather was most favorable; not a d was to be seen, and a breeze helped rry away the dust raised by the cars.

dawn the crowd, which had been ered about, thronged to the starting t, and lined the road, awaiting the ex-g moment. The officials had already ed, and it was exactly 3:30 o'clock 1, the sun being above the horizon, ott, on his De Diétrich car, was sent midst the acclamations of the people. ne minute intervals the other com-ors followed. Though the motor cy-were sent off two by two every min-he last man had not started before 6:45 ck in the morning. It had taken hours and a quarter to start all the les; yet the immense crowd of enthu-s had remained almost intact, showing nuch interest in the departure of the man as they had done in that of the

1 amusing incident occurred at the . One of the competing vehicles was d for debt, but the bailiffs relented and ved its owner to take part in the race.

ie total number of starters is variously rted as 197, 216 and 223, and the actual ber of starters, including motor cy-s, was undoubtedly in the neighbor-1 of 200. It is estimated that 300,000 ole were present at the start.

ALONG THE ROUTE.

uring the earlier part of the race the cédès, three of which followed a few s one behind the other, gave the test impression of speed. They sped g with extraordinary ease and smooth-and regularity in the work of the or. The Mors, however, held them in point of speed. The light Renault also put on a terrific pace. The Pan-ls and De Diétrichs, during this por-of the route, seemed to be doing less . Mark Mayhew's Napier was going y at Trappes. In the latter village a gutter across the paved road was the e of some extraordinary sights. Cars nded up literally 3 feet in the air when dashing in and out of it. A Serpollet came to grief at this point, and had to be shunted into a shed. Madame du Gast, driving her beflowered 85 horse power De Diétrich herself, was wildly cheered as she whirled by. Rigolly, piloting a huge 100 horse power Gobron-Brillié car with a lady by his side, as his mechanician, scored another popular success. Last came the motor bicycles, but not least as regards the impression of speed produced on spectators.

Preparations had been fully completed at Rambouillet some time before the first start was effected from Versailles. Troop-ers of a cuirassier regiment were posted at intervals of 10 yards to keep the road clear, and a strong force of gendarmerie had been brought out to second their ef-forts. The members of the local bicycle club, and cyclists from the neighboring districts, had volunteered their services for the "control," and at spots whence good views could be obtained hundreds of spec-tators had gathered.

The first automobile which appeared was that of M. René de Knyff, followed by those of Jarrott, Louis Renault, Théry and Werner. There was little distance be-tween this lot, the last of whose cars had passed by 6:30.

As at Rambouillet so was it at Chartres, where large crowds were out in the early morning, the scene being most animated. Another regiment of cuirassiers, as well as an infantry battalion and a number of gen-darmes, kept the ground clear, and the local bicycle club made itself very useful. At Chartres the leaders passed in the fol-lowing order: L. Renault, Jarrott, De Knyff, Théry, Madame du Gast, M. Far-man and H. Farman.

Châteaudun was passed by Louis Re-nault, still leading, at 5:21, Jarrott being four minutes behind him. Werner came by at 5:35, Stead at 5:40 and Baras at 5:45. Madame du Gast appeared at 5:49, and each of the Farmans two minutes after-ward. The distance now covered was 119 kilometres. Louis Renault, Jarrott, Wer-ner, Théry, Stead, Baras, Tourand, Mad-ame du Gast and Maurice Farman were leading when Vendôme was passed. When Tours was reached Louis Renault was still the first, and he arrived at Cha-tellerault, 284 kilometres from the starting point, at 7:47:25. Jarrott came next, at 8:8:40, Baras arriving third, 8 minutes and 7 seconds later. Next in order were Mar-cel Renault and Maurice Farman.

There was a tremendous crowd at Poi-tiers, 316 kilometres, which Louis Renault, always leading, passed at 8:23:5, fol-lowed by Jarrott, at 8:43:42, and then by Baras, Théry, Maurice Farman, Mar-cel Renault and Jenatzy, and at 9:15 by Madame du Gast, who was treated to an ovation. Louis Renault passed Ruffec, 383 kilometres, first, at 9:30 o'clock, and when Angoulême, 426 kilometres, was reached, he again came in first, the hour being 10:7, Jarrott arriving next at 10:30.

AT BORDEAUX.

The race had also excited extraordinary interest throughout the southern part of France, and sightseers flocked into Bor-deaux in such numbers that Saturday night the hotels were all full to overflow-ing, and quite exorbitant prices were ob-tained for the most primitive accommo-dation. The terminus of the day's jour-ney was about 4 kilometres beyond the confines of the city of Bordeaux. The weather was beautifully fine, though hot. It was thought that the first car might ar-rive at Bordeaux soon after 11 o'clock, but these expectations were hardly fulfilled, and the passengers who came by the special train which was following the race were the first to tell how the start had been delayed by the enormous crowd gath-ered on the highway near Versailles. Early telegrams also announced that M. Four-nier, René de Knyff and Henry Farman had met with breakdowns, and were prac-tically out of the race, while another mes-sage made it known that Louis Renault, the brother of the winner of the Paris-Vienna contest, was leading.

This report proved to be correct, for at 12:14:45 Louis Renault dashed up to the control at a speed which could have been little short of 50 miles an hour. He had started from Paris third, at 3:47, and had consequently been eight hours and twen-ty-seven minutes on the road. As the neutralization for the towns amounts to three hours and ten minutes, this leaves an actual running time of five hours and seventeen minutes.

It was not until sixteen minutes later, at exactly 12:30, that the second arrival lit-erally flew up to the control. This was the heavy De Diétrich car, driven by Jar-rott. He had been the first to start, and notwithstanding much trouble encountered on the road, had managed to make most excellent time. The next arrival was M. Gabriel on his Mors machine, with its curiously shaped body, who arrived at 1:08, and accomplished the speed record of the race. He was sixteenth on the list of starting, and did not leave Versailles until 5:1.

THE RESULTS.

The times in the class for heavy cars were as follows:

	H.	M.	S.
1. Gabriel (Mors)..........	5	13	31 1-5
2. Salleron (Mors)..........	5	46	1 4-5
3. Jarrott (De Dietrich)....	5	51	55
4. Warden (Mercedes).....	5	56	30 4-5
5. De Crawhez (Panhard)..	6	1	8 2-5
6. Voigt (C. G. V.).........	6	1	9 1-5
7. Gasteaux (Mercedes)....	6	8	0
8. A. Fournier (Mors).....	6	11	39
9. Rougier (Turcat-Mery)..	6	16	7 4-5
10. Moulter (De Dietrich)..	6	17	54 1-5
11. Penatzy (Mercedes).....	6	24	8 2-5
12. Teste (Panhard).........	6	34	8 2-5
13. Max (Mercedes).........	6	39	35 4-5
14. Le Blon (Gardner-Serp.)	6	43	51 4-5
15. Berteaux (Panhard).....	6	46	55
16. Augieres (Mors)........	6	52	49 3-5

In the class for light cars the winners were:

	H.	M.	S.
1. Louis Renault	5	39	59
2. Barras (Darracq)	6	12	49
3. Page (Decauville)	6	19	8

The winner of the class for voiturettes was M. Masson (Clement), and of the motor cycles M. Bucquet (Werner).

Up to 6 p. m. seventy-one car had arrived, the first motor cycle being the last of them. Madame du Gast, the only woman competing, arrived at 5:45 on a De Dietrich, amid much enthusiasm. Hieronymus, who will drive a German car in the Gordon Bennett Cup race, arrived fortieth.

MARCEL RENAULT'S ACCIDENT.

Near Couhé Verac the road makes a double curve, which is very sharp. Here a man was stationed with a red flag to signal the danger by waving the flag. Marcel Renault took this turn at a high speed, his right front wheel caught in a piece of drain pipe on the pavement and the car immediately turned round, smashing a wheel and overturning into a ditch. A moment later Maurice Farman came by, and when he saw Renault lying bleeding by the roadside he stopped and helped him to a farm house. Renault was frightfully cut about the face, had both legs broken, and has since died of his injuries. When his brother Louis heard of the accident at Bordeaux he at once ordered all Renault cars to discontinue the race.

LORAINE BARROW'S ACCIDENT.

An eyewitness of the accident to Loraine Barrow, at Arveyres, near Libourne, gives the following account: At about 1:40 o'clock on Sunday afternoon the automobile No. 5, piloted by Loraine Barrow, left the controlling station at Libourne, near the bridge over the Dordogne. The car was running full speed ahead along the straight road from the bridge mentioned to the railroad crossing of Arveyres. No supervision was exercised on this road, although the flyers were to go over it at their highest pace. While car No. 5 was racing with tremendous rapidity an object was perceived on the road before it, and the motorists sounded their horn twice. Then ensued the crash, near the part of the road marked Kilometre 22. The car dashed against a tree, close to a farmhouse and was knocked over. The people who rushed to the scene of the accident found the chauffeur dead. Loraine Barrow was thrown out, and was lying on his back by the roadside. He was senseless, and it was thought that he was dead. He was at once removed to a doctor's house, and was there attended to. The car was smashed, and some yards behind it the dog which caused the accident was lying crushed. Barrow's leg has been amputated.

L. PORTER'S ACCIDENT.

The Wolseley car No. 243, driven by L. Porter and Mr. Nixon, both of Belfast, came to grief near Bonneval. At 11 o'clock the person whose duty it was to signal the railroad crossing with a yellow flag had received instructions authorizing him to leave his post. At 11:55 Mr. Porter's car approached at full speed. Instead of going round to the left the car made straight for hut No. 86, occupied by a gatekeeper with which it collided. Mr. Porter was thrown forward several metres, and the car caught fire. The gatekeeper rushed to the car and managed to extinguish the fire, which was threatening to spread to the hut. After putting out the fire he went to the assistance of the victims. Mr. Nixon, the engineer, was found burned to death under the car. Mr. Porter was lying a few yards away in a dazed condition. He was taken to the Bonneval Hospital, where he regained consciousness at 2 p. m.

M. TOURAND'S ACCIDENT.

The terrible accident at Breuty, near Angoulême, by which three lives were lost and two men dangerously injured, was caused by a child of seven years of age. The child started to run across the road as car No. 23, driven by M. Tourand, came rushing along at tremendous speed. A soldier of the 107th Infantry Regiment seeing the danger, sprang forward to save the child. He was struck by the car and instantly killed. The shock caused the car to swerve and to run into a tree. M. Tourand received serious spinal injuries, and Norveau, his chauffeur, was instantly killed. Two men who were standing by the roadside were run over by the fugitive car. One of them, another soldier, died in twenty minutes. The child escaped unharmed.

OTHER ACCIDENTS AND MISHAPS.

Mr. Stead was thrown into a ditch in an attempt to pass M. Salleron. Mr. Stead's car collided with the rear wheel of M. Salleron's car and was overturned.

An extraordinary accident happened to Mr. Terry, the American driver, who was piloting a 60 horse power Mércèdes car. As he was entering the village of Coignieres, with its paved roadway, running at about 70 miles an hour and coming close up behind Mr. Porter on a Wolseley car, he turned to the left to pass Mr. Porter. But the Wolseley car turned to the left at the same moment, and Mr. Terry, to avoid collision, ran up the pavement. As his wheels came in contact with the sharp flint pavement the tire of his front left wheel burst, but such was the terrific speed at which he was running that the car, although skidding, dashed past the English car and flew sideways for 300 yards across the roadway in front of Mr. Porter's car. Then the gasoline tank took fire, and in an instant the car was roaring in flames. Mr. Terry sat stupefied and was pulled out of the burning machine by his chauffeur.

Georges Richard ran into a donkey cart at Angoulême and injured two persons. He had several ribs broken and his chest crushed. The driver of the donkey cart was knocked over, but only slightly injured.

M. Hautvast's car caught fire at Angoulême, but, having extinguished the fire, the owner continued the race. Near St. Symphorien (Indre et Loire) the mécanicien of Baron de Caters, No. 27, was thrown into a ditch and cut about the face, but his injuries did not prevent him from proceeding.

Mark Mayhew, who drove a Napier, No. 138, had an accident near La Gironde. Suddenly the front wheels of his car spread apart, and the steering became uncontrollable. The mechanic, Mosses, jumped, turned several somersaults and was only bruised and dazed. The car headed for a tree, and Mr. Mayhew put on the full brake force, but nevertheless received a severe shock. His ribs were much bruised by the steering wheel and his legs injured by the ignition and other levers. The cause of the accident was a flaw in the metal of one of the steering connections.

At Grand Pont M. Rivierre's automobile ran into a bridge while swerving to avoid a woman who was passing, and one of its wheels was broken. At Chartres the machines driven by Fournier, Mr. Vanderbilt and Baron de Forest, having sustained damage, which rendered it impossible to proceed, their owners gave up the race.

Lieut. Mansfield Cumming abandoned the race through the bending of the crank shaft, owing to the breaking of a lubricating pipe. When the fact was discovered the oil poured in and the motor took fire.

Mr. Austin, of the Wolseley Company, stopped through a crosshead pin running hot and breaking the connecting rod at Couhé-Verac, 213 miles from Paris.

The Hon. C. S. Rolls had to leave his Panhard car through the engine practically parting from the frame.

THE RESPONSIBILITY FOR THE ACCIDENTS.

It is said that when reports came into the French Ministry of the Interior announcing fatal accidents and disasters to cars, M. Combes lost patience and said: "Stop the race at once. We ought never to have authorized it. This is what comes of trying to please the Automobile Club."

Monday morning, at an early hour, telegraphic instructions were sent to the French Ambassador at Madrid, directing him to call the attention of the Spanish Government to the terrible results of the race in France, and to inform the Spanish authorities of the decision of the French Government to stop the race on French territory.

Senor Silvela, the Premier, soon afterwards telegraphed to the frontier to stop the race on Spanish territory.

The Secretary of the Automobile Club of France was sent for by the Ministry of the Interior, and the decision of the French Goverment was officially communicated to him. He claimed that the regulations issued by the Government concerning the race were scrupulously carried out, and that the expense to the club had been very great. Nothing had been left undone to assure the security of the public. Of course, some of the competitors behaved rashly in taking the sharp turns too quickly and in endeavoring to pass each other.

...OUR... FOREIGN EXCHANGES

The Responsibility of Owners.

An interesting case bearing on the above question came up at a recent court session in Mannheim, Germany. The principle was laid down that the owner of the vehicle if he is a sportsman himself is responsible for the manner of driving of a man in his employ. Joe Livingstone, of San Francisco, at present residing in Frankfort-on-Main, on August 28 last made an automobile trip from Frankfort to Baden-Baden via the mountain road, together with his chauffeur, P. Müller, who drove the machine. In Sulzbach he was stopped by a policeman, on the ground that his speed was too high for the narrow streets of the town. He was sentenced to a fine of 25 marks, which fine was approved by the county court. In the court of appeal it was explained by the chauffeur that a layman is unable to estimate the speed of an automobile, and besides he had not driven beyond 12 kilometres per hour, as he was running on the second gear, and his employer had specially instructed him to drive slowly. The testimony of the witnesses in regard to the speed was conflicting, one comparing it to that of a galloping horse and another to the speed of an express train. Attorney for defendant, Dr. Seelig, second vice president of the Rhenish Automobile Club, demanded exoneration of his client, as the speed control of an automobile depends entirely upon the driver, who in this case had acted upon the orders of his employer, by running on the second gear and thereby regulating the speed of the vehicle at exactly 12 kilometres per hour. A passenger could do no more than give his orders. He emphasized that the highland population often interfered with automobilists, and their antipathy must be counted with. Defendant had run the total distance of 200 kilometres in nine and one-half hours, or at an average speed of 23 kilometres an hour, so it was quite possible that in towns the limit of 12 kilometres had not been exceeded.

The court rejected the appeal, holding that a speed of even 12 kilometres per hour was too high for the narrow streets of Sulzbach; but according to the testimony the speed must have been higher, and defendant was therefore guilty of a violation of the automobile ordinance. The driver of a vehicle, in the first place, was responsible for the speed of a vehicle, but a good deal of the responsibility rested on defendant, particularly as he was a sportsman, was capable of estimating speeds and as the chauffeur was in his employ. It had long since been experienced that unfortunately the drivers of automobiles pay little attention to their surroundings, and for this reason the fine imposed by the county court was very small, and the court was sorry that the district attorney had not also taken an appeal.

English Reliability Trials, 1903.

The A. C. G. B. I. has decided to give marks in the reliability trials to be held in September next, as follows: Reliability, 3,000; cleaning, 1,500; hill climbing, 1,000; condition, 1,000; brakes, 250; steering, 250; silence, 250; vibration, 250; speed, 500; dustlessness, 500; starting on hill, 250; absence of smoke, 250; appearance (finish), 250; appearance after trials, 250; cleanliness, 125; accuracy of horse power, 250; fuel consumption (in relation to power), 500; cheapness, 250. Special medals will be awarded for simplicity of construction, conspicuous improvement, and accessibility. The highest number of marks in each class will secure a gold medal. The last three items, for which gold medals will be awarded, will have no specific number of marks, and the matter will depend entirely on the judges' opinions. So far as the 3,000 marks for reliability are concerned, one mark will be deducted for each minute or part of a minute during which a stop is made on the road. Out of the 1,500 will be deducted one mark for every minute during which the cars wait for cleaning, adjustment, or refilling before starting on their daily trip.

Reliability losses will occur when any stops are made after the driver has decided to start his car for the day.

The Nice week in 1904 will be from March 20 to 28.

An automobile club has been organized in Gothenburg, Sweden, with Count Hamilton as president, Henry Ripp vice president and Harold Grebst secretary.

The *Eclaireur de Nice* states that the Prince of Monaco left his principality on May 16 for Paris on a motor bicycle. He was followed by M. Jaquin in an automobile.

A scheme is on foot for the tarring of the principal roads in the Riviera, in order to exterminate the dust nuisance. It is estimated that $10,000 will be required to effectually do the work.

In the new Panhard racers the four cylinder 85 horse power motor has its shaft inclined, the rear end being higher than the front end in order that the large diameter flywheel may clear the ground sufficiently.

W. H. Long, the president of the Local Government Board for England, in the course of a speech at Trowbridge on May 16, stated that the present law was a farce. Everyone broke it. He added that the practice of putting policemen about the roads in all sorts of disguises in order that they may catch motor cars going above the regulation speed ought not to be adopted unless in the interests of safety.

It has been proposed by the authorities in Switzerland to station pilots at both ends of all difficult mountain passes, such as the St. Gothard, Furka, etc., to pilot automobiles across. The measure is now being discussed.

The Automobile Club of France held its annual meeting on May 9 last. The report of the treasurer, M. Lediheux-Vernimmen, showed that during 1902 the society of encouragement had had a surplus of 103,000 francs and the social organization, the Cercle, a surplus of 141,000 francs.

According to reports the fatal accidents of the Paris-Madrid race have had a great effect on the speed at which automobilists drive in Paris. There were only three furious driving cases before the Paris police courts on June 3, while the number usually lies between twenty and thirty.

The sports committee of the A. C. F. has decided not to formally class the arrivals at Bordeaux in the recent race. The prize offered by the city of Bordeaux for the best time from Paris to Bordeaux was awarded to M. Gabriel (Mors) and the Arenberg cup for alcohol driven vehicles to M. Rigolly (Gobron-Brillie).

It is reported that the German automobile industry will be fully represented at the St. Louis Exposition next year. Automobiles will form a part of group 72 of German exhibits, and the management of this division of the exhibition has just been entrusted to Herr Director Freund by the German general commissioner.

Lord Balfour, in the House of Lords on May 23, said that he had consulted the president of the Local Government Board, who was quite willing that the bill to regulate the speed of motor cars should originate in the House of Lords. He would endeavor to have it presented on as early a day as possible after the Whitsuntide recess.

The Chambre Syndicale du Cycle et de l'Automobile (Paris) at its meeting of May 12 adopted a protest against "the attempts of certain sport clubs or associations to secure wholesale trade terms from manufacturers of tires, accessories and spare parts, this method of proceeding being injurious to the interests of the manufacturers and dealers."

In contrast to a number of Bavarian towns which levy a pavement toll and harass automobilists in other ways we read in *Automobil Welt* of a small town, Illertissen, in that country which has erected signs at its various entrances bearing inscriptions somewhat as follows: "Illertissen. Stop! Stop! Automobile Re-

sort, Elks Inn; Repair and Supply Station, X. P., near the Town Hall."

Owing to the outbreak of public opinion against road racing the Belgian Automobile Club has postponed its Ardennes-Ostend race indefinitely.

The A. C. G. B. and I. has revised its speed bill by adding a number of clauses. One provides that any person instituting proceedings under this law, who has done so against the wrong person, shall pay all expenses incurred by the person prosecuted. Licensing hired drivers is also to be proposed and the Local Government Board is to have the right to revoke the license of any driver after repeated misconduct.

The postal vote of the A. C. G. B. I. has been concluded, and the voters have approved the legislative proposals of the club by 1,015 votes to 463. These proposals include the removal of the present speed limit, the amendment of the law with regard to furious driving, the raising of the tare limit for commercial vehicles, and the identification of motor vehicles by means of conspicuous numbers or names.

The following "warning" appears in a German automobile publication: "The so called beehive cooler in its different forms of construction, with round as well as prismatic tubes, has been secured to us by German patents No. 122,766, A9,149 and by design patents Nos. 117,418, 152,454, 152,571 and 152,572, as well as by foreign patents. All infringements of our rights will be legally prosecuted.—Daimler Motor Company, Cannstatt."

Motor bicycle reliability trials organized by the A. C. G. B. I. will commence on Monday, August 10, will be arranged similarly to those for the cars, and will consist of nine daily runs from the Crystal Palace to various well known places, covering a total distance of about 1,000 miles, finishing up on Saturday, August 22, with a series of speed trials, on the Crystal Palace track, for those machines that have successfully gone through the trials on the road.

Following is a list of the cars of leading firms starting and finishing in the Paris-Bordeaux section of the Paris-Madrid race: Mors, thirteen started, six finished, average time 6h. 50m. 20s.; Mercedes, twelve started, nine finished, average time 7h. 30m. 8s.; Pipe (24 horse power), four started, two finished, average time 8h. 14m. 16s.; Panhard, sixteen started, nine finished, average time 8h. 45m. 43s.; De Dietrich, ten started, six finished, average time 8h. 46m. 16s.; C. G. V., four started, three finished, average time 8h. 55m. 40s.; Gobron-Brillie, five started, three finished, average time 9h. 9m. 52s.; Serpollet (steam), seven started, six finished, average time 9h. 48m. 20s.

Club Notes.

NAHANT A. C.

The Nahant (Mass.) Automobile Club will run a line of automobiles from Central square, Lynn, to the homes of summer residents at Nahant. Only members of the club and their families will be allowed to ride in the new autos.

COLONIA C. C.

On account of the increased use of automobiles by members a committee has been appointed by the Colonia Country Club, of Colonia, N. J., to establish a garage for their special convenience. A practical repairer has been secured.

LOUISVILLE A. C.

The club held an automobile parade on May 30 in which twenty-seven cars took part. A squad of mounted policemen led the way and one of the leading vehicles carried part of the First Regiment Band. Upon reaching Fountain Ferry a lunch was served and a number of speeches made, Ira G. Barnett serving as toastmaster.

A. C. OF ST. PAUL.

The Automobile Club of St. Paul (Minn.) has been incorporated and has elected the following officers: President, R. C. Wight; vice president, Paul H. Gotzian; secretary, A. W. Farrar; treasurer, Gustave Scholle. These, together with S. J. Joy, H. J. O'Brien, W. B. Joyce and J. S. Bryant, compose the incorporators.

BERKSHIRE A. C.

The club held a hill climbing contest on West street, Pittsfield, on May 30, which resulted very satisfactorily, and the event will be repeated on Snake Hill at an early date. Silver trophy cups of special design will be awarded to Charles K. Crane, of Dalton, and City Treasurer E. H. Kennedy, of Pittsfield, the winners of first prizes for hill climbing, with gasoline and steam carriages, respectively.

NEW JERSEY A. AND M. C.

The New Jersey Automobile and Motor Club, of Newark, was organized on May 26. Fifty automobile owners signed the membership roll. Dr. H. C. Harris presented a constitution and bylaws, which were adopted. The active membership is limited to 500. The entrance fee and yearly dues for active members are $10, and for associate members $5. The temporary officers are: Chairman, R. C. Jenkinson; vice president, Dr. H. C. Harris; secretary, E. E. Sargent; treasurer, C. R. Hoag.

A. C. OF PHILADELPHIA.

The Automobile Club of Philadelphia is issuing a series of practical road guides for the use of its members. We have received a copy of road guide to route No. 5, from Philadelphia to the Delaware Water Gap, a distance of 90 miles. The guide gives the names of towns passed en route, the distance to each, kind of road surface in each section, steepness of grades and their condition and road directions. Blanks have also been issued to members for collecting data for new road guides or for correcting the old ones. The plan is an excellent one and deserves to be imitated.

BUFFALO A. C.

On June 2 the reorganization of the old automobile club was effected by the election of the following named officers: William H. Hotchkiss, president; A. J. Knoll, vice president; Fred J. Wagner, secretary; E. R. Thomas, treasurer; governors, Dr. L. H. Smith, Bert L. Jones, Edward H. Butler. The officers of the old club, who resigned last night, were: Ellicott Evans, president; H. A. Meldrum, vice president; E. R. Thomas, treasurer; John M. Satterfield, secretary; governors, George S. Metcalfe, Bert L. Jones and Dr. L. H. Smith. About 250 automobilists were present. Mr. Hotchkiss was appointed to draft a consitution and bylaws. A discussion of the Bailey bill followed. H. A. Bull said the law nullified local regulations and he believed that if a court should be called upon the law would be declared unconstitutional.

A. C. OF BRIDGEPORT.

On Monday, August 31, Bridgeport, Conn., will inaugurate an Old Home week carnival, which will comprise parades nearly every day, together with marine displays, fireworks, band concerts, etc. This celebration will open Monday morning, August 31, at 10 o'clock with an automobile parade, and a committee has been appointed by the A. C. of Bridgeport to make the necessary arrangements and have full charge of the affair. A. L. Riker, vice president of the Locomobile Company of America, is chairman of the committee, and W. S. Teel, Jr., vice president of the A. C. of Bridgeport, is secretary. Invitations have been sent to all the automobile clubs, as well as to individual owners of motor cars in the vicinity of Bridgeport. It is the desire of the committee that all automobilists who can get to Bridgeport on that day take part in the parade and that where possible clubs or squads of automobilists run to Bridgeport the Sunday previous and remain over for the parade. It is expected that this feature will be made very attractive and prizes will be awarded for the best decorated automobile. Automobilists are requested to write to Mr. Teel and get copies of invitations for circulation.

Trade Literature Received.

Lee, Cowan & Bowen, Syracuse, N. Y. —"Carriage, Wagon and Truck Springs."

Olds Motor Works, of Detroit and Lansing, Mich.—New catalogue of the Oldsmobile.

The Buick Manufacturing Com[...] troit, Mich.—"Buick Automobi[...] a 5x6 single cylinder, ho[...] engine. "The Buick F[...] Engine."

LEGISLATIVE AND LEGAL.

Some Mooted Questions Under the Bailey Law.

Since the passage of the Bailey bill it has been discovered that it is so ambiguous in respect to a number of important points that the exact intention of its framers can only be finally determined by test cases and court decisions.

In the opinion of leading New York attorneys the questions likely to lead to the most trouble are those that concern the present force of the Cocks law in its relation to the new statutes.

If it is to be supposed, for instance, that the maximum speed limit of 20 miles an hour imposed by the Cocks law is still operative, why does the Bailey bill read "no ordinance adopted by any municipality, in pursuance of this section, *or of any other law*, shall require an automobile to travel at a slower rate of speed than 20 miles an hour" in the open country? It would certainly seem fair to infer from the wording of this clause that it must have been intended that the Bailey bill should repeal that portion of the Cocks law which set the maximum speed permitted anywhere in the State at 20 miles an hour. Otherwise, why does the Bailey bill state that the open country speed limits "shall not be *lower* than 20 miles an hour," and the Cocks law that they "shall not be *higher*"? If this were the intended effect it would seem that the framers of the Bailey bill would have spoken more directly to the purpose, and said that "the speed limit in the open country shall in all cases be 20 miles an hour." As the bill stands, however, it certainly would appear that the general 20 mile an hour speed limit of the Cocks law had been repealed, leaving it to the local authorities to set this limit anywhere above 20 miles; and that, pending such legislation in any given locality, there is nothing to prevent the reckless automobilist from proceeding at an excessive speed without law breaking.

Another question that has been raised has to do with the placing of signs by the local authorities, marking the limits of slow speed near post offices. Inasmuch as the law reads: "*If the local authorities indicate by an appropriate sign,*" etc., it is held by some that, in the absence of such signs, and until they are placed, any speed is legal within the half mile distance from post offices.

The question of whether convictions could be had for fast running under the foregoing conditions is, of course, one that can only be settled by test cases, it being borne in mind, moreover, that the courts are exceedingly unlikely to construe an ambiguous law in favor of the reckless automobilist.

There also seems to be some doubt as to just which users, other than owners, are required to take out "operators' certificates." The bill reads: "Every person desiring to operate an automobile as *mechanic, employee* or *for hire,*" shall secure an operator's certificate. Borrowing friends and relatives are thus left unconsidered, yet penalties are provided for *any* "person who shall operate an automobile without a certificate."

N. A. A. M. and Legislation.

The N. A. A. M. sends out to members, automobile clubs and owners the following circular:

In Connecticut and Delaware the laws now in force relating to the use of automobiles on the highways are sane and reasonable. They afford a refreshing contrast to the vindictive and absurd law recently enacted in New York State. Governor Benjamin B. Odell, Jr., of New York, signed the so called Bailey Bill subsequent to vigorous protests made by this association and others interested in the proper and careful employment of motor cars for pleasure and for business.

We are well aware that just complaints have been made by individuals and localities against the improper and unlawful use to which owners of automobiles have put their carriages. We have no sympathy with careless, reckless or inconsiderate driving. We are as anxious as anyone to have the wholesome and indeed severe provisions of the Highway Law and the Penal Code firmly enforced. But because some individuals have violated, and do violate, the law relating to the use of their machines upon the public highways, we find no justice in the attempt made in some States to so amend the existing statutes that an automobilist is liable to be stamped as a criminal for any slight and unintentional disregard of the law.

We believe that well directed effort by automobile clubs, manufacturers and the ever increasing number of owners will be productive of uniform and fair regulations which will provide for severe punishment to the few who are unmindful of the comfort and safety of others, but which will not take away from law abiding automobilists their right to the free use of the highways.

We invite your co-operation in the work for—

1. Reasonable and uniform laws.
2. No discrimination against the automobile in favor of the horse, mule or "other domestic animals."
3. Adequate penalties for the suppression of that enemy to the automobile industry and sport, namely, the reckless driver.

On May 25 the Stearns Automobile Company, of Syracuse, N. Y., was sold out at sheriff's sale.

Automobile Laws of the State of Connecticut.

AN ACT REGULATING THE SPEED OF MOTOR VEHICLES.

Section 2089 of the general statutes is hereby amended to read as follows: No motor vehicle shall be run on any highway or public place at a rate of speed dangerous to life and property, or on any highway or public place outside the limits of a city or borough at a rate of speed to exceed 15 miles an hour, or on any highway or public place within the limits of any city or borough at a rate of speed to exceed 12 miles an hour. Upon approaching a crossing of intersecting streets or roads, the person having charge of the power of such vehicle shall have such vehicle under control, and shall reduce the speed of such vehicle until said crossing of such street or road shall have been passed. Upon meeting or passing any vehicle drawn by a horse, the person having charge of the power of such motor vehicle shall reduce its speed, and if the horse drawing said vehicle appears to be frightened, the person in charge of said motor vehicle shall cause said motor vehicle to come to a stop. Whenever the term "motor vehicle" is used in this section, it shall include all vehicles propelled by any power other than muscular, excepting the cars of electric and steam railways and other motor vehicles running only upon rails or tracks. No city, town or borough shall have any power to make any ordinance, bylaw or resolution respecting the speed of motor vehicles, and no ordinance, bylaw or resolution heretofore or hereafter made by any city, town or borough in respect to motor vehicles shall have any force or effect; provided, however, that powers heretofore given to any city or borough to regulate shows, processions, assemblages or parades in streets and public places, and to regulate the use of public parks, and all ordinances, bylaws and regulations which may have been or which may be enacted in pursuance of said powers, shall remain in full force and effect. The mayor of any city, the selectmen of any town, or the warden of any borough, may, upon any special occasion, or whenever in their judgment it may be deemed advisable, grant permits to any person or persons or to the public to run such motor vehicles during a specified time or until such permit is revoked, upon specified portions of the public ways or highways of such city, town or borough at any rate of speed, and may annex such other reasonable conditions to such permits as they may deem proper. Any person violating any of the provisions of this section shall be fined not more than $200, or imprisonment not more than thirty days, or both.

AN ACT CONCERNING THE REGISTRATION AND NUMBERING OF AUTOMOBILES AND MOTOR VEHICLES.

Section 1. No automobile or motor vehicle shall be used or operated upon the

ıblic highways of this State after July 1, ..903, unless the owner thereof has complied with the requirements of Sections 2, 4 and 5 of this act.

Sec. 2. The owner of every automobile or motor vehicle shall file in the office of the Secretary of the State a statement of his name and address, together with a brief description of every such vehicle owned by him, on a blank furnished by the said secretary for the purpose, and shall obtain from said secretary a numbered certificate for each of such automobiles, which certificate shall state the name of the owner of such vehicle and that he has registered in accordance with the provisions of this act.

Sec. 3. The Secretary of the State shall keep a record of all such statements and of all certificates issued by him, which record shall be open to the inspection of any interested party at all reasonable times.

Sec. 4. Every such automobile or motor vehicle shall have the initial letter of this State and the number of the certificate issued for such vehicle displayed upon the back thereof in a conspicuous place and manner, the letter and figures of such name and number respectively to be at least 3 inches high.

Sec. 5. A fee of $1 shall be paid to the Secretary of the State for each certificate issued by him in accordance with provisions of Section 2 of this act.

Sec. 6. No license, permit or registration shall be required of the owner or operator of any automobile or motor vehicle condition of operating such vehicle, in accordance with the provisions act, nor shall any such vehicle be required to be marked in any way except in accordance with the provisions of this act. But nothing in this section contained shall apply to such automobiles or motor vehicles as are offered to the general public hire.

Sec. 7. The provisions of Sections 1, 2, 4 and 5 of this act shall not apply to such automobiles or motor vehicles as are owned by manufacturers of or dealers in such vehicles, and are not employed in the private business or for the private use of such manufacturers or dealers.

Sec. 8. The provisions of this act shall not apply to automobiles or motor vehicles or to the owners thereof, provided, that such owners shall have complied with the law of any other State or Territory of the United States which shall have in effect a law similar in all respects to Sections 1, 2, 3, 4, 6, 7 and 8 of this act, except that in such event such owners shall display the initial letter of such State or Territory in place of the initial letter of this State.

Sec. 9. The penalty for violating any of the provisions of this act shall not be less than $5 nor more than $25.

Sec. 10. This act shall take effect from its passage.

The trustees of Alva, Okla., have decided that automobiles shall pay a 50c. tax.

Automobile Law of the State of Delaware.

Following is the text of the Delaware law approved on March 31:

Section 1. After the approval of this act any person using an automobile upon any of the public highways of this State shall slow down the speed of said automobile upon approaching any wagon, carriage, buggy or other vehicle to which there is a horse, mule or other animal used for drawing wagons, carriages, buggies or other vehicles harnessed or attached, and if the horse, mule or other animal attached to said wagon, carriage, buggy or other vehicle becomes badly frightened by the approach of said automobile, so that there is danger of injury to the occupant or occupants of said approaching wagon, carriage, buggy or other vehicle, then the owner or driver of the said automobile shall bring it to a full stop, and so remain until those occupying the said wagon, carriage, buggy or other vehicle shall have passed safely by. The owner or driver of any automobile using any of the highways of this State shall not use the said highways without first providing himself or herself with a horn, bell or some other instrument by which he can warn other persons using said highways of his approach, and the owner or driver of said automobile shall give due warning when approaching other vehicles where the highways by reason of curves obscure the said automobile from view of his approach.

Sec. 2. Any person or persons violating the provisions of this act shall be liable to a fine of not exceeding $10 for each offense, to be recovered before any justice of the peace of the county in which said offense is committed.

Sec. 3. Nothing in this act shall be construed to curtail or abridge the right of any person or persons injured in person or property to entertain a civil action for damages by reason of injuries received for or on account of the use of said automobiles on the public highways of this State, and for which they are entitled to damages by a civil action.

The city marshal of Baltimore, Md., has issued orders to the police captains to watch closely the speed of automobiles, and more particularly in the suburbs. Owners of automobiles must observe the 6 mile an hour speed limit, and any violation will be prosecuted.

J. J. Phillips has brought suit against the General Automobile and Manufacturing Company, of Cleveland, Ohio, to recover the price of an automobile he bought from the company, plus the repairs he had to make, his time at the rate of $50 a day, etc. He places his damages at $5,805.

An ordinance limiting the speed of automobiles to 8 miles an hour within a radius of three-quarters of a mile from Main and Howard streets, and to 12 miles an hour outside of that district, was introduced in the Akron, Ohio, City Council on June 1, and was referred to the committee on streets and ordinances.

The Buffalo Automobile and Auto-Bi Company, of Buffalo, N. Y., has been dissolved by order of court. E. N. Mills, as referee, recommended dissolution. There were no debts or assets.

The Government inspectors of steam vessels have notified the ferry companies operating on the Delaware River that tanks containing explosives must be emptied before automobiles can be allowed on the boats.

Samuel J. Roberts, of Kansas City, Mo., who on May 15 was struck by an automobile run by Lee Clark, has sued for $50,000 damages and $350 for doctor's and hospital fees. As a result of his injuries Roberts has been declared insane by a jury in the probate court.

James T. Goodwin, of Wheeling, Va., has begun suit for $911.44 against M. Rosenheimer and J. L. Kunz, doing business under the name of the Kunz Automobile Company, of Milwaukee, Wis., claiming that an automobile they sold to him is not up to contract.

A bill in equity was brought on June 2 against the District of Columbia and the District commissioners to enjoin them from enforcing the new automobile regulations. The nominal complainant is Carl J. Lockwood, agent for the Stanley Motor Carriage Company, but behind him are all those automobilists who are opposed to the regulations.

Erskine M. Sunderland, secretary of the National Capital Automobile Club, of Washington, D. C., was fined $20 on June 1 on the charge of having speeded his automobile 17 miles an hour. The case will be carried to the Court of Appeals by the National Capital Automobilists' Association, which was recently organized to test in the courts the new regulations of the District.

Charles R. Greuter, of Springfield, Mass., has brought a bill of complaint against Arthur De Collard, of the same city, to settle a difficulty over certain patents for an improvement on friction clutches and a new steering device for vehicles that were assigned to De Collard under an agreement by which the plaintiff was to receive $2,500, which was to be repaid by him under certain terms, one of which was an extension of time for the repayment, but which the plaintiff claims the defendant refuses to allow, and intends to sell his interest in the patents, free from the rights of redemption. A temporary injunction has been issued.

Since the new automobile law went into effect in New Jersey 2,200 licenses have been issued, but it is authoritatively stated that a large percentage of owners' declarations are defective, in that they do not the style of the body of the aut The Attorney General has ion that it is necessary th whether the license is

neau, surrey, runabout or touring car. Sixty per cent. of the applications are for licenses for runabouts and 50 per cent. of them so far have been from New York and Philadelphia automobilists. In one day last week thirty-three applications were made by women.

The revised automobile bill of Massachusetts remains in the hands of the House Ways and Means Committee. The principal change of most general interest relates to the speed allowance, which is reduced from 20 to 15 miles without and from 12 to 10 miles within the limits of a city or town. Since the bill was last printed Rep. Klemm, of Boston, has given notice of an amendment to the bill providing a penalty of $50 for the first offense; $50 to $100, or thirty days' imprisonment, or both, for the second, and imprisonment not over thirty days and a fine of $100 to $250 for subsequent offenses. Representative Davis, of Amesbury, House chairman of the Committee on Roads and Bridges, has given notice that he will move to amend the new draft by inserting a new section providing for locks to lock the starting lever.

A. A. A. Affairs.

A. R. Pardington, of the Long Island Automobile Club, Brooklyn, was chosen chairman of the racing board, in place of William J. Stewart, resigned.

At a special meeting of the directors of the American Automobile Association on June 2 amendments to the constitution and bylaws were adopted providing for an individual membership. All interested in the sport in any way are now eligible to membership, are entitled to one vote each, and are to pay $1 initiation fee and $1 annual dues.

New Incorporations.

New York Auto Car Company, New York; capital, $30,000; directors, Bernard Uhren, John Lurie and J. Head, all of New York city.

The Bates Automobile Company, of Lansing, Mich.; capital, $60,000; stockholders, M. F. Bates, James P. Edmonds and Bliss Stebbins.

The Corbin Motor Vehicle Company, New Britain, Conn.; capital stock, $200,000; incorporators, Philip Corbin and Howard S. Hart, of New Britain, and Charles M. Jarvis, of Berlin.

The Waldorf Motor Car Company, of 1 West Thirty-fourth street, New York; capital, $10,000; officers, George L. Haley, Jr., president; George C. Peckham, vice president, and John E. Stannard, secretary.

The Berwick Auto Car Company, Hastings, Mich.; capital, $500,000; officers, chairman, M. B. Martin, Grand Rapids; vice chairman, P. T. Colgrove, Hastings; secretary, Franklin D. Eddy, Grand Rapids, and treasurer, Thomas Benjamin, Grand Rapids.

MINOR MENTION

The Frantz Body Company, Akron, Ohio, has been reorganized under the management of Mr. Loomis.

The Chelsea Manufacturing Company, of Chelsea, Mich., are about to add another building to their plant.

The American Society of Mechanical Engineers will hold its summer meeting at Saratoga, N. Y., from June 23 to June 26.

The Conestoga Automobile and Wheel Company is the name chosen for the new company which will locate at Lancaster, Pa.

A company is being formed in Boston to handle the United States patents of the Flexible Spring Tire Company, Ehrenfeld, Germany.

The Pabst Brewing Company, of Milwaukee, Wis., are having an automobile truck built by the Rainier Company, of New York.

The Woodruff Automobile Company, Akron, Ohio, are building a three cylinder machine which, it is expected, will be finished in about six weeks.

Gray & Davis, Amesbury, Mass., are now manufacturing thirty different styles of lamps in their new factory, specially constructed for the business of lamp making.

The Oakes & Morse Company, of 40 Sudbury street, Boston, are making a spark plug called the "Comet," using platinum wire for spark points and mica for insulation.

The Clinton Manufacturing Company, 27 State street, Boston, Mass., manufacture the "Hercules" soap, which is specially adapted for removing grease and dirt from the hands.

The Orient buckboards which won honors in the Yonkers and Reading races were regular stock machines fitted with a twenty tooth driving pinion instead of the usual fourteen tooth pinion.

The American Tubular Wheel Company, of Pittsburg, Pa., are about to place on the market an all steel artillery wheel, with larger spokes than their last year's model and having a new method of fastening to the hubs.

H. T. Alexander & Co., of 34 Water street, New York, are placing upon the market a lubricating oil for automobile engines for which they obtained the formula from France in 1901. The oil has a viscosity of over 280 and a flash point of 506 degrees.

At the annual meeting of the Buckmobile Company, of Utica, N. Y., on June 1 the following were elected directors: A. Vedder Brower, H. E. Streeter, W. H. Birdsall, Samuel Campbell and A. J. Seaton. The directors elected these officers: President, A. J. Seaton; vice president, Samuel Campbell; secretary and treasurer, A. Vedder Brower; manager, W. H. Birdsall, and superintendent, H. E. Streeter.

C. Q. Richmond will erect an automobile storage station in connection with his hotel at North Adams, Mass.

On June 6 five 1903 model "F" Packards were expressed by the Packard Motor Car Company from Warren, Ohio, to San Francisco.

W. H. Canniff and Harrison Cale have opened an automobile agency at Davenport, Ia. They will be agents for the Flint automobile. Temporary quarters are at Fourth and Perry streets.

Willy Tischbein arrived in New York on or about June 1 for the purpose of establishing an agency for the automobile tires of the Continental Caoutchouc and Gutta Percha Company, of Hanover, Germany.

The Electric Storage Battery Company, of Philadelphia, are now manufacturing batteries for ignition purposes, their line including fourteen sizes, from 33 to 85 ampere hours capacity. The batteries are known as the Exide sparking batteries.

According to Cooper Hewitt, inventor of the static converter, which caused such a furor in electrical circles some months ago, experiments now in progress seem to indicate that this device will soon be commercially useful for charging electric automobiles from alternating current circuits.

It is reported that Lee & Porter, axle makers of Dowagiac, Mich., and Charles Messhaw, of Grand Rapids, are effecting a merger of half a dozen kindred concerns for the purpose of manufacturing automobiles. The plant will be located either at Dowagiac or Buchanan.

Incorporation papers will be asked for the Co-operative Automobile Association of America, of Pittsburg, Pa., the object of which is to provide a fund by the subscription of its members to purchase automobiles on the co-operative plan. Among the applicants will be W. A. Donkin, L. C. Letzkus, J. E. Anderson, F. E. Jackson, G. C. Jackson and S. H. Patterson.

J. Insley Blair's 35 horse power Panhard touring car, which won the 5 mile race for gasoline cars weighing over 1,800 pounds, at the Empire City Track, Yonkers, N. Y., on May 30, was protested on the ground that it was under weight, as it weighs only 1,600 pounds. It was announced by A. R. Pardington, the referee, that the protest had been sustained and the Blair car disqualified. First prize accordingly will go to Laurence Waterbury's Mercedes and second prize to the Central Automobile Company's 18 horse power Mors.

The Mechanical Spark Generator Association of America was organized at a meeting at Indianapolis on May 30. V. G. Apple, Dayton, Ohio, was elected president; B. E. Tritt, South Bend, Ind., secretary and treasurer, and E. R. Harding, Chicago, H. N. Motsinger, Pendleton, Ind., and Frank Remy, Anderson, Ind., an advisory committee. A dozen manufacturers were represented, and only

two are said to remain outside the association. Another meeting will be called in five or six weeks.

Charles E. Miller, of New York, has secured the agency for the Seewell goggles.

McKinley & Eddy, of Mitchell, S. Dak., have taken the agency for the General automobile.

The rural automobile free mail delivery service between Knoxville and Sevierville, Tenn., was inaugurated on May 28.

A company is being organized at Tenopah, Utah, to operate an automobile bus line between that place and Sodaville.

The Jones-Corbin Company, of Philadelphia, have increased the price of their improved runabout from $1,000 to $1,250.

At the annual carriage builders' convention in Boston next September automobile parts will be included in the exhibition for the first time.

The Berwick Auto Car Company will erect a plant in Hastings, Pa., a bonus of $2,000 being given on condition that the company invests $25,000 and employs twenty-five men the year around.

Caps Brothers, Kansas City, Mo., are installing machinery for the manufacture of automobiles. They have increased their capital stock from $35,000 to $75,000. Several machines have been made by them.

Mr. Dingman, manager of the motor tire department of the Goodyear Tire and Rubber Company, Akron, Ohio, sailed on the Teutonic today for Europe. Mr. Dingman will be present at the Gordon Bennett Race and will be away about two months.

Among those who have entered the 1904 winter meet on the Ormond-Daytona, Fla., race course are L. P. Mooers, of Cleveland; Henry Ford, of Detroit; Barney Oldfield, of Toledo; George C. Carmon, of Cambridge; F. E. Stanley, of Newton; John Wilkinson, of Syracuse; Earl Kiser, of Dayton; Tom Cooper, of Detroit; George Holley, of Bradford, and J. C. Brandes and C. S. Wridgeway, both of New York.

The Selden Patent.

In Selden patent matters Detroit seems to be the storm centre at present. It is reported on good authority that the Association of Licensed Automobile Manufacturers has thus far failed to license the Ford Automobile Company and the Marr Auto Car Company, of that city, who are just coming on the market with their product. These two companies, it is further reported, have sought the advice of counsel and are disregarding the infringement notices served upon them by the association. Unless new developments occur shortly it is probable that the Selden patent will be contested first in Detroit.

Geo. H. Day, manager of the Association of Licensed Automobile Manufacturers, when seen by a Horseless Age representative, said:

"The Association of Licensed Automobile Manufacturers continues to gain strength. In addition to its present membership, including twenty-seven of the most prominent manufacturers in the country, applications from as many more concerns are now pending before the executive committee. Several of the patents controlled by the association, which will soon be made public, promise to influence strongly the lines of future automobile development.

"The policy of the association is to be strictly one of technical development, rather than of profit making. To this end new inventions of merit will be encouraged, and the widest possible application made of such as are now restricted in their use. Financial standing, engineering ability and business reputation are to be the points most considered in the granting of licenses; and the suppression of wildcat and irresponsible concerns the sole reason for withholding them.

"Rumors of litigation to be instituted by outside concerns persist, but so far no definite move has been made."

N. A. A. M. Matters.

At the last meeting of the association it was decided to hold an endurance test in the fall in conjunction, if possible, with the American Automobile Association. The route proposed is New York to Pittsburg, via Philadelphia, Baltimore and Washington. After the run, hill climbing and consumption tests, and possibly races will be held, the events to extend over three or four days. A commercial vehicle contest, to be held in New York, may also be run. The details of the foregoing events will be settled at the next meeting of the association, June 30.

The association has formed a bureau of publicity.

S. A. Miles, of Chicago, has been appointed general manager of the association with headquarters at the general offices.

A contract has just been closed which will greatly reduce the expenses connected with the Chicago Show for the next three years. It is understood that the cost of exhibition space will in future be less than half what it has been heretofore.

The committee refused to take any action in reference to chauffeurs, laid on the table the report of its special committee as to its recent conference with the American Automobile Association committee on the subject and discharged the committee.

The American Auto Storage Company, of 40 West Sixtieth street, New York city, was admitted to membership in the National Association of Automobile Manufacturers. The Pope Motor Car Company has also joined the association.

The Bailey law came up for discussion at the meeting. The association will test the new statute on such points as its counsel may advise to be unconstitutional. Charles Thaddeus Terry was appointed permanent counsel to the association, and will have charge of the conduct of the test cases.

MOTOR VEHICLE PATENTS..

United States Patents.

728,667. Storage Battery.—J. C. Brocksmith, of Chicago, Ill. May 19, 1903. Filed January 14, 1902.

A high capacity, "pasted" battery, the invention relating particularly to the construction of the grids. The grids comprise frames for supporting the active material and conducting rods embedded in the active material. The plates formed of the grids and active material are spaced apart by washers made of insulating material and are united by insulating rods passing through the plates and washers.

729,405. Power Transmitting Device.—Otto F. Persson, of Lynn, Mass. May 26, 1903. Filed April 12, 1902.

A variable throw transmission. The variable throw is produced by means of an eccentric on the engine shaft, an eccentric rod joined to the middle of a curved slotted link, in the slot of which a link block is slidably arranged. One end of the curved link is pivotally fixed. The link block is moved in the slot by means of a lever and link and a worm and nut arrangement. The transmission to the rear axle is by connecting rods and a pair of reversible roller ratchets. The invention relates particularly to details of the ratchet.

725,700. Hydrocarbon Oil or Gas Engine.—E. W. Graef, of Brooklyn, N. Y. April 21, 1903. Filed December 13, 1901.

726,862. Brake.—Ulric de Civry, Paris, France. May 5, 1903. Filed July 30, 1902.

726,908. Cushion Tired Wheel.—Martin Halfpenny, Pontiac, Mich. May 5, 1903. Filed August 2, 1902.

726,967. Automobile.—Chester B. Mills, Wilmerding, and Anthony Williams, Pittsburg, Pa. May 5, 1903. Filed April 30, 1902.

726,976. Variable Speed Mechanism.—Henry M. Norris, Cincinnati, Ohio. May 5, 1903. Filed February 2, 1903.

726,986. Carburetor for Gas Engines.—Adolph Peteler, St. Louis, Mo. May 5, 1903. Filed April 7, 1902.

727,076. Vehicle Tire.—Rufus W. Brooks, Portsmouth, Va. May 5, 1903. Filed October 6, 1902.

727,117. Reversible Galvanic Battery.—Thomas A. Edison, Llewellyn Park, N. J. May 5, 1903. Filed October 3, 1902.

727,143. Reversing and Speed Reducing Mechanism.—Thomas B. Jeffery, Chicago, Ill. May 5, 1903. Filed November 23, 1900.

727,158. Incandescent Igniter for Gas Engines.—James S. Lang, Boston, Mass. May 5, 1903. Filed April 16, 1902.

727,276. Motor Vehicle.—Thomas L. Boyle, Ogden, Utah. May 5, 1903. Filed November 14, 1902.

THE HORSELESS AGE

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Spring Suspension of Convertible Two and Four Passenger Vehicles.

The convertible body vehicle, which is normally used as a two passenger car and on special occasions converted by the addition of a tonneau or by opening the front compartment into a four passenger machine, is just now in great favor. The practicability of this construction is especially striking in the case of the medium weight machines, those intermediate between the big touring cars and the light runabouts. Built primarily as two passenger vehicles they are yet sufficiently powerful to easily carry four on a trip "over the boulevard," etc., and this possibility adds greatly to the value of these machines. The manager of a prominent Western concern manufacturing a single seated car, which is furnished either with or without detachable tonneau, states that 80 per cent. of his vehicles are ordered with tonneau.

One of the problems connected with these convertible cars that have not yet been solved to complete satisfaction is that of spring suspension. If the springs are made stiff enough to be right for four passengers they are too stiff for two passengers, and as most of these cars generally carry two passengers only the loss of comfort resulting from too stiff springs is a rather serious matter. The proportion of spring load capacity desirable with two and four passengers respectively is particularly great when the propelling machinery is not carried by the body springs, and a manufacturer of this type of car supplies auxiliary springs to be attached to the regular rear springs when four passengers are carried, as mentioned in our last issue.

There is no doubt that some similar attachment is also needed in cars of the convertible body type in which the machinery is carried by the body springs, and it is understood that a number of spring makers are at present directing their efforts toward the production of a practical detachable device of this kind.

Standardization of Crank Shafts.

Crank shafts for gasoline engines are now for the most part made by drop forging plants to the order of engine manufacturers. Drop forging is the most economical method of construction, as the cranks can be forged very close to size and little material need be removed in the lathe. Besides, the very best and toughest steels may be employed.

Manufacturers making a specialty of crank shafts complain of the want of uniformity in the design of these shafts. Evidently crank shafts for engines of the same bore and stroke and using approximately the same compression should be alike in dimensions, but this is far from the case at present. Referring to single throw cranks, some designers employ a short crank pin of large diameter, to make the crank case as narrow as possible and for other reasons, while others, who give more importance to the saving of friction loss, make the pins long and of comparatively small diameter.

The desire to secure "talking points" encourages designers to go to extremes in this matter. A layman will, for instance, readily see and be impressed with the strength of a crank having a short, large diameter pin, while the fact that a longer pin of smaller diameter but the same bearing surface would cause less friction loss is not likely to be obvious to him. The "golden mean" is as much indicated in this as in other matters of practice.

When cranks for multiple cylinders are considered the problem of standardization becomes one of considerable complication, but there should be no difficulty in arriving at an agreement as to standards for single cylinder crank shafts. If such standards were worked out and manufacturers agreed

to adopt them in their next year's models, as they have agreed upon uniform lamp brackets, the mass manufacture of crank shafts by the drop forging process would be greatly facilitated and motor manufacturers would share with the drop forging concerns in the benefits resulting from the reduction in cost of construction.

We do not wish to be understood as thinking it impossible to standardize multiple throw crank shafts, but the subject naturally presents greater difficulties, and it might be well to start with single throw shafts. The experience thus gained would aid in the standardization of multiple throw shafts at a later period. Here is a problem the N. A. A. M. may well take the trouble of looking into, for the crank shaft is a very important part, and any reduction in cost of construction and improvement of proportions would be well worth while.

Alcohol Fuel Again.

Though apparently the chances of alcohol in competition with gasoline as a fuel for internal combustion engines are much smaller in this country than abroad, its possibilities are still the subject of considerable interest. In a few years American automobiles will undoubtedly find an extensive market in the West Indies and in South American countries, and in these parts alcohol is at present cheaper and much more readily obtained than gasoline. In the tropics especially the dangers and difficulties of storing gasoline are a strong factor in favor of alcohol.

For some time there has been a demand in Cuba and Brazil for stationary motors running on alcohol, and a New York firm of kerosene engine manufacturers, in order to meet this demand, has recently made successful experiments to adapt its engines to this fuel. It is found, according to these manufacturers, that a mixture of four pints of alcohol and two pints of water will develop 4 horse power for one hour, though the proportions of the mixture should be varied in accordance with the compression used in the engine.

The agitation for untaxed alcohol continues unabated in this country. An association composed of manufacturers who make use of alcohol in their business is making efforts to further the cause in every possible manner. The use of alcohol in the arts and industries is far more extended than is generally supposed and the removal of the tax on it would be a great encouragement to these industries. In a recent pamphlet it is pointed out that a high tax on alcohol is especially injurious to the export trade. The exports in articles in the manufacture of which alcohol is used have not grown apace with exports in general in the last few years, and the cause is claimed to be the relative disadvantage at which American manufacturers are placed as compared with the manufacturers of Great Britain, France and Germany, whose revenue laws provide for tax free alcohol for use in manufactured articles for export.

As the removal of the tax from alcohol is one of the essential conditions of its successful use as a motor fuel, automobilists will undoubtedly generally be in sympathy with this campaign for untaxed alcohol.

Late Deliveries.

Much complaint is heard from recent purchasers of automobiles that manufacturers are not living up to their delivery guarantees. In some cases which have come to our notice delivery has been delayed for months after the date agreed upon, and as a result a number of lawsuits have already been instituted to recover deposit money. One of the reasons for the slowness of delivery is the extraordinary rush of business with most of the manufacturers, but perhaps even a more important cause is the difficulty of obtaining raw materials. Practically all the manufacturers are handicapped by this condition, for which they are, of course, not responsible. We would therefore advise purchasers of automobiles who are not able to obtain their vehicles at the specified date of delivery to cultivate patience, as the manufacturers in most cases undoubtedly are doing their best to make good their agreements, but are prevented from doing so by causes beyond their control.

Where the Profits Go.

In a recent article on the motor car industry of France, in a London daily, the writer, who is evidently thoroughly familiar with his subject, makes the statement that although the industry is generally considered at the zenith of prosperity few firms are paying dividends to their stockholders. Three reasons are assigned for this state of affairs, as follows: In the first place new models are gotten out very frequently, and each one of these represents an enormous outlay in preliminary expenditure and trial constructions. Secondly, the greater part of the product of leading manufacturers is marketed through middlemen, who sometimes buy the complete output of factories for long periods in advance and exact unreasonable discounts. But the greatest evil of all is the tax placed upon the industry by the great road racing competitions. These races compel the makers to pay heavy retaining fees to a large staff of professional racers, and lead to lavish expenditure in preliminary trials and models. Heavy expenses are frequently incurred in perfecting details of the racing cars, which are never used in the stock machines.

A conservative estimate places the capital sunk in the racing machines which ran in the Paris-Bordeaux race at $1,000,000. Of these cars a considerable portion was reduced to junk during the one day and few, if any, of the machines that survived the trial will ever fetch the makers a price equal to their cost of construction. The cost of getting the machines in line, of establishing repair facilities along the route, and the expenses of the racing teams can only be conjectured. But the enormous burden these competitions throw upon the industry are sufficiently obvious. The profits which should go to the investors in automobile enterprises are being sacrificed to the speed craze.

Calendar of Automobile Dates and Events.

June 18—20.—Paris Automobile Fetes.
June 18—28.—Aix-les-Bains Auto Events.
June 20—21.—Circuit des Ardennes.
June 25.—Start of Chicago A. C.'s Run to Mammoth Cave.
July 1—15.—Irish Fortnight.
July 2.—Gordon Bennett Cup Race.
July 3, 4 and 5—Endurance Run of the New York Motor Cycle Club to Boston and return.
July 12—19—Ostend Automobile Week.
July 24—Quarterly 100 Miles Trial of A. C. G. B. I.
August 10—22—Tourist Motor Bicycle Reliability Trials.

Canadian Customs Announcement.

The Canadian Department of Customs has announced that automobiles (not new) in use by tourists coming temporarily into Canada and not domiciled in Canada may be passed upon deposit of an amount equal to the duty, subject to refund upon exportation within the time prescribed by the collector, not exceeding six months from date of arrival. The automobile is not to be used for gain or hire in Canada, and an invoice showing the selling price thereof should be produced to the collector of customs as an aid to him in determining the amount of the deposit required. This information is obtained from a recent United States Consular report in which it is stated that several United States papers of recent date have given incorrect information on this point.

The Starting Operation.

By Albert L. Clough.

A considerable portion of the prejudice which still exists against the gasoline vehicle arises from the necessity of cranking the engine in order to start the vehicle.

Many automobile motors are, of course, arranged to be started from the seat, and some of the four cylinder engines which use the jump spark are practically self starting after short stops by the simple operation of moving the spark timer to the position where the sparking circuit of the proper cylinder is closed.

The majority of vehicles, however, must be cranked from the ground after the preliminary operations are completed. Practically all the cars of the French type are cranked from the extreme front of the vehicle and necessarily from the ground.

It is quite an advantage to have the crank permanently attached to the engine shaft through a ratchet mechanism, as the trouble of attaching it and removing it and of storing it away in the vehicle is thus avoided. The danger of its being lost is also obviated. The necessity of flooding the carburetor or performing a priming operation in order to secure the first explosion is one of the steps of the starting process which ought to be done away with, if possible. If it cannot be dispensed with it should be so conveniently arranged as to be the work of an instant, not to necessitate the laying back of any part of the machine or to require stooping under the vehicle or soiling the hands. In order to prime the carburetor of some machines the backboard or bonnet must be lifted before the operation can be performed.

The turning on of the lubricating oil is a necessary part of the starting operation unless splash lubrication, a mechanical force feed system, or cups actuated by the pressure of explosion are employed.

If a magazine lubricator is used the trouble of turning on the supply is minimized, but where there are several independent cups the operation of starting is correspondingly complicated. Mechanical lubricators are certainly very convenient in this respect.

An attempt to start the engine with an early spark is likely to result in a sprained wrist, if nothing worse, especially if the cylinder be large. There is nothing more "jarring" to the system than to have a large engine "kick back" when the whole strength of the chauffeur is acting in the opposite direction, and the provision of means to automatically set the spark late in the stroke, before starting can be attempted, is a valuable point in any automobile. An interlocking device connected with the spark timer and acting to prevent the attachment of the crank, unless the spark be in the late position, forms a useful feature of one well known car. In some cars the spark is normally set at a position sufficiently late for safety in starting, and is advanced by means of a pedal acting against a spring which serves the purpose of an "accellerator" in speeding up the engine, only so long as it is pressed down.

The provision of relief cocks conduces to ease in starting, but their use is by no means general except upon single cylinder engines which, if of any considerable size, should pass compression only with great difficulty.

A person who has just acquired an automobile is almost sure to make "bad breaks" when attempting to start his engine unless he is very cool and methodical by nature. Too often one sees an owner step jauntily up to his machine at the curb for the purpose of making an exhibition for the benefit of the assembled throng. After making a few passes at the machine he gives the crank a smart twist, but the expected does not happen, even after several breathless attempts. He generally finds that the switch plug is in his pocket, or that he has not turned on the gasoline, when he comes to the thinking stage of the performance. All this boggling hurts the reputation of the automobile as a practical conveyance.

There should be a regular routine of operations when starting, and one should be deliberate in performing them. For instance: The oil may first be turned on and the relief cock opened, if one be provided (in some machines the oil is automatically started when the relief is opened and vice versa). The gasoline may be turned on and the carburetor may then be primed. (It should not be necessary to shut the main gasoline valve when making ordinary stops.) A glance should be taken at the spark timer to make sure that it is in its late position; the engine cranked, if a single cylinder affair, until it is just over compression; the switch put on and the crank given a smart turn, when it will start as it passes the next spark point.

A certain order of procedure, if adhered to, becomes habitual and there is no likelihood of any failure.

If a motor fails to start with its accustomed promptitude, it is folly to twist the crank exhaustively. There is a reason for the failure, which requires for its correction mental rather than physical energy. Of course, the trouble is due rather to a failure of the spark, a lack of charge, or to loss of compression. Perhaps the inlet valve has stuck and fails to operate, allowing no gas to be sucked into the cylinder. If the valve be accessible a touch will determine whether it be free or not. Sometimes in motors having an inaccessible inlet valve, a little stem is provided to allow one to test the valve's condition.

The auxiliary spark gap, which is now widely advertised under the names of "spark intensifier" and "spark insurer," while it is not a cure-all for ignition difficulties, does furnish ocular evidence as to whether the spark is passing or not, and assists in locating this class of troubles.

It is a good idea, when a machine is to be left but a short time in a safe place, to perform some of the starting preliminaries when the machine is stopped. The gasoline need not be shut off, the compression cock may be opened, thus allowing any surplus oil to drain off; the spark timer may be set in the late position and the crank attached. The starting is thus simplified and facilitated.

Sometimes when one has occasion to leave the machine on a down grade, it may be started without cranking; for as soon as the brake is released the machine will begin moving by gravity and after it has acquired some momentum the spark may be switched on and the highest gear engaged, when the engine will readily start. This should not be attempted with a car that has to pass through the low gear to get into the high, as too great strains are imposed upon the transmission mechanism.

When machines are not supplied with brakes which can be locked in the "on" position, a retarding effect sufficient to hold the car may be secured by throwing in the lowest gear after the motor is stopped, with the compression cocks closed.

Side Spring Suspension.

By Hugh D. Meier.

The term side springs commonly applied to the body springs of an automobile is scarcely correct, inasmuch as most automobiles are provided with springs which are placed under or next to the sills and run parallel with them. Side springs belong to the semi-elliptic or the quarter elliptic type. To save weight and metal quarter elliptics are frequently employed. Each spring is bolted to the frame and the space between the ends is filled in with wood, which is molded to give the impression of a continuous spring. One prominent builder employs a continuous main leaf and cuts off the other plates. Such springs cannot easily be classified; they are neither semi-elliptics nor are they quarter elliptics. Another manufacturer of prominence has adopted semi-elliptic side springs and makes the main leaf out of Norway iron and the spring plates of spring steel. The main spring in this case is not resilient, but will "give" much more without fracturing than any plate of spring steel will. Should the spring proper be fractured it is reasonable to expect that the main leaf of this high grade iron will still support the body and machinery.

Few manufacturers of cars equipped with side springs have given this question of the most suitable metal the consideration it merits. With human life at stake all reasonable precautions should be taken to prevent accident from this cause.

Side springs projecting from the panels of the body would undoubtedly mar the appearance of any motor carriage. This apparently is the view taken by practically all builders of machines into the construction of which such springs enter; consequently the springs are placed in such a way as to be flush, or nearly flush, with the panels. If the body is a narrow one and the springs are located as described, the axles are sub-

jected to greater strains than they would be if the springs were set further apart. All things being equal in these cases, excepting the distance between the springs, the width of body and the factor of safety of the axles, designers should spread the springs as much as possible, if for no other reason than to guard against unnecessarily burdening the axles. A wide body affords comfort to its occupants and ample room for the machinery, but it limits the arc in which the front wheels can be turned and, therefore, calls for a standard tread.

To employ rivets or bolts to hold the spring down to a pedestal is a most primitive method of securing the springs to the front axle. It is equally bad to hold the rear end in a block, the office of which is to provide means for chain adjustment. Such a spring is subjected to a great twisting strain whenever one of the road wheels is raised by an obstruction or when it sinks into a depression in the road. The ends of side springs should terminate in shanks which fit into suitable hubs and serve as fulcrums for the springs, which are thereby partially relieved of twisting strains. Horse drawn vehicles that are fitted with side springs are all provided with an under frame which corresponds to the reaches of some automobiles. In these wagons the springs are invariably hung from shackles.

The good riding qualities of the up to date motor vehicle must, in a large measure, be ascribed to the absence of reaches. This is true of the car with side springs, too; the only type, however, which should be provided with reaches. Perhaps the advocates of the side spring will dispute this assertion and argue that reaches are not desirable for the reason that they mar the flexibility of the running gear. Quite so; but reaches are wanted in connection with this type of car as long as a perfect control of the steering mechanism and a long life of the tires are prime considerations. If, for instance, one of the springs of a machine with side spring suspension is deflected more than the other, that spring will become extended and throw the axles out of parallelism; unless both springs (which are then subjected to a great bending strain, which threatens to shear off the bolts securing the springs to the framework) offer resistance without giving way. Usually there is some play or "give" to momentarily throw the axles out of true (in this case parallelism) and affect the steering. With side or tiller steering of the conventional types the steering lever will be more or less deflected. On long runs over rough roads this action of the lever tires the operator. That it may also cause the machine to swerve and cause an accident is quite within the range of possibility.

It will be seen that a locked steering device is not adapted to a reachless machine with side springs, unless a resilient member be interposed somewhere between the main steering arm and the main knuckle arm. Spreading of the axles takes place as soon as such a vehicle is loaded and the steering lever assumes a corresponding position. With a heavier load these conditions are again changed; hence there is a straight ahead position of the steering lever for every load and not one position for all loads, as there is in machines with a different system of suspension. The tires on the front wheels of cars with side springs wear more than they would were reaches employed to prevent spreading of the axles, when the machine is in motion. The distance rods to the rear axle must permit the axle to move back relatively to the body of the car, when the springs are deflected. This relative motion of the axle tends to turn the drivers in the opposite direction to which they are revolving and has the same action on the tires as braking has, viz., to wear off the rubber. This action of the rear axle causes the chain to "whip," a phenomenon characteristic of these machines. Undue strains and "whipping" no doubt account for the excessive wear of such chains and their tendency to run off the sprockets. When the springs recoil after having been deflected they pull the front axle back and retard the motion of the front wheels momentarily. As a result the tires slide over the ground and rubber is worn off.

For side springs with fulcrumed ends it is claimed that the use of pivots eliminates all twisting strains. A glance at the accompanying sketch will show that this is not correct. The cut illustrates a front axle, side springs, etc., in elevation. The dotted lines show one wheel raised and the other in a depression. The fulcrums E and F change their positions so that they are not in line with A B and C D, respectively, and the springs must be warped and twisted to fulfill the conditions imposed upon them. They must remain bolted to the frame and yet extend through the hubs of the axle. However, all springs placed longitudinally are subjected to twisting strains, and as no means for eliminating these strains is provided, side springs suffer no more in this respect than do other springs set the same way.

ELEVATION OF FRONT AXLE.

In spite of their faults side springs ride exceedingly well and have many points in their favor. They do not extend beyond the wheels, as do all the rest, with the exception of the platform variety, whenever long springs and small wheels are used. With a wheel base of 6 feet or more they must be long, unless quarter elliptics, set far apart, are employed.

Manufacturers are not likely to pay much attention to the problem of eliminating twisting strains as long as their competitors find no solution, for the reason that cost of material is such an obstacle. Spreading can only be prevented by employing reaches or distance rods and hanging the springs by means of shackles. A pair of forked reaches pivoted in the middle of the front axle should give good results.

Commercial Motor Vehicles in France.

(Continued.)

By Dr. Leon Guillet.

GARDNER-SERPOLLET STEAM OMNIBUS.

The firm of Gardner & Serpollet has been the pioneer in the line of steam motor vehicles in France, and has met with conspicuous success. The types of commercial vehicles manufactured by this firm are well known, and we shall confine ourselves to enumerating the special features of the company's omnibus.

The principal parts of the Serpollet system are the steam generator, the motor, and the feeding apparatus. The generator is of the so called instantaneous vaporization (flash) type, with forced circulation. Water is fed to the generator at every instant to the exact amount, which insures transformation into superheated steam. The fuel used is ordinary kerosene.

The omnibus herewith shown is designed to carry ten passengers on the inside, with their baggage. Packages are placed on top of the roof, which is surrounded by a guard railing.

The vehicle may attain a speed of 20 miles an hour on level road, and even 25 miles an hour on good pavement; grades of 8 per cent. are taken at a speed of 6 to 7½ miles per hour. The useful load is 2,640 pounds, and the weight of the vehicle, inclusive of supplies, 4,840 pounds. The load is divided on the two axles as follows:

	In Running Order.	With Full Load.
Rear ....Pounds.	2,800	5,280
Front	2,040	2,200
Totals	4,840	7,480

Both front and rear wheels are 40 inches in diameter, and are shod with pneumatic tires. The diameter of the front axle spindles is 1.6 inches. The length of wheel base is 104 inches, and the tread 58 inches. The over-all dimensions of the vehicle are: Length, 13 feet 4 inches; height, 6 feet 8

inches; width, 6 feet. The flash boiler has a heating surface of 62 square feet and is stamped by the boiler inspection authorities as capable of carrying 50 kilogs. per square centimetre (720 pounds per square inch) pressure. The engine is of the four cylinder, single acting type, and has a bore of 3.28 inches and a stroke of 3.6 inches. It drives the rear axle directly through a single chain at a reduction of 5:1. The engine develops 20 horse power at a steam pressure of 170 pounds per square inch. The engine speed is controlled by the operator by varying the feed of water and fuel to the boiler.

The following braking means are provided: (1) A steel band brake lined with blocks of fibre, acting upon drums fastened to the spokes of the rear wheels. This brake is very powerful and equally efficient for forward and backward motion. (2) The reversal of the engine, either with or without steam admission, the latter constituting the most smooth acting and economical means of checking the speed on long down grades. (3) A spoon brake acting on the rear wheel tires direct and operated by means of a rack and lever. This brake simply serves the purpose of locking the vehicle in place when standing still.

The omnibus illustrated in actual service makes two daily trips, one in the morning and one in the afternoon, the total distance of the daily runs being 100 kilometres (62 miles). It was subjected to test runs on the route, Paris-Melun, and made the trip with six passengers at the rate of 29.1 kilometres (18.2 miles) per hour. The fuel consumption for the 100 kilometres was 56 litres (15 gallons) of kerosene.

PEUGEOT GASOLINE WAGONS.

The Peugeot firm a number of years ago installed a special service of motor trucks and delivery wagons with the object of demonstrating to manufacturers and merchants the advantages to be secured by substituting motor traction for animal traction. These vehicles are equipped with the Peugeot gasoline motor with electric ignition. The wheels have wood spokes and are fitted either with solid rubber or plain steel tires, at the option of the purchaser. The rear wheels of the truck for heavy loads are equipped with crossbars of steel and intermediate bars of wood, the object being to prevent slipping. The front wheels are provided with a flange of steel or with rubber tires.

Among the different types manufactured by Messrs. Peugeot we mention the following: (1) A 7 horse power delivery wagon, which is capable of carrying a useful load of 1,200 kilogs. (2,840 pounds). The wheel base of this wagon is 90 inches; the width, 52 inches; the total length, 110 inches. The length of the loading space is 104 inches and the width of same, 64 inches. (2) A 5 horse power delivery wagon, which is capable of transporting 400 kilogs. (880 pounds). (3) An 8 horse power truck,

GARDNER-SERPOLLET STEAM OMNIBUS.

capable of transporting 2,000 kilogs. (4,400 pounds); the total length of this wagon is 9 feet 4 inches and its width 56 inches. (4) An 8 horse power delivery wagon for carrying a load of 1,800 kilogs. (4,000 pounds). (5) A 9 to 10 horse power truck, to carry 3,000 kilogs. (6,600 pounds). While the running gear frames of all the other vehicles are tubular, that of the last mentioned truck is of channel iron.

TURGAN & FOY STEAM WAGONS.

Much interest was aroused in the vehicles of this firm some years ago when the heavy machine "Quo Vadis" was put to extensive test on the highways for a long period. In October, 1900, M. Turgan made a trip to Tunis with this wagon, which also figured in the London Exposition the following spring. Finally it made the trip from Paris to Berlin in the touring section of the Paris-Berlin Race, completing the trip in twelve days. The same vehicle was placed at the disposition of the foreign officers at the military review at Rheims on the occasion of the Czar's late visit to France.

In all the types of commercial wagons manufactured by this firm two compound engines are fitted, each driving one of the rear wheels independently, through the intermediary of a chain. In this manner one of the most delicate devices is done away with—the differential gear. No change gear is employed, the flexibility of steam permitting of doing without it.

The boiler is of the firm's own type and is placed at the front of the vehicle; it contains 108 square feet of heating surface and about 5 square feet of grate surface. The horizontal engine is located below the footboard. The running gear frame is built up of channel steel of great strength, and between the main beams of the frame is placed a large tank, serving as a supplementary water reservoir.

The diameter of the driving wheels differs in the various vehicles in accordance with the use to which the frame is to be put. The driving wheels of the omnibus are 48 inches and those of the truck 40 inches. The tires are 120 millimetres (4.8 inches) in the case of the omnibus and 150 millimetres (6 inches) in the case of the truck. The track is the same for the front and rear wheels—68 inches.

Following are some particulars concerning the boiler and engine: The assemblage of the boiler and auxiliary apparatus weighs 1,400 pounds. The boiler is allowed to carry 225 pounds of pressure per square inch and at this pressure generates 7 pounds of steam per pound of coal burned. The engines weigh 363 pounds each and have cylinders of 3.6 and 6.8 inches bore respectively and of a common stroke of 5.2 inches. The maximum speed of the engines is 600 revolutions per minute. At this speed each engine develops 20 horse power, making a combined power of 40 horse power. The engines are reversed by means of a Stevenson link motion.

The chief aim of the manufacturers has been to produce a commercial vehicle of thoroughly solid construction. The weight empty is 7,920 pounds for the truck and 8,800 pounds for the omnibus carrying eighteen passengers. Messrs. Turgan & Foy at present build three different types of commercial vehicles, as follows: (1) a combined truck and tractor capable of moving at a speed of from 8 to 10 kilometres (5 to 6 miles) per hour, loads up to 10 tons; (2) delivery wagons capable of transporting 4 tons at an average speed of 12 kilometres (7½ miles) per hour; (3) an omnibus for fourteen to eighteen passengers capable of an average speed of 15 kilometres (9½ miles) per hour, and a maximum speed on level road of 25 kilometres (15 2-3 miles).

Commercial Vehicles.

Electric Express Wagons.

The Adams Express Company recently placed an order with the Vehicle Equipment Company, of Brooklyn, for eighteen electric delivery wagons to be used in place of their familiar type of horse drawn vehicles. The first of these vehicles, all of which are built alike, has just arrived and been placed in commission in New York city. The others are to follow in a few weeks.

The cut on this page shows the general features of these wagons, which are built on the standard lines that characterize the Vehicle Equipment Company's product. The following specifications are common to all of the eighteen machines: Length over all, 9 feet 6 inches; wheel base, 7 feet 6 inches; tread, 4 feet 8 inches; goods compartment, 7 feet long, 3 feet 7 inches wide, 5 feet 8 inches high; weight, 4,500 pounds; carrying capacity, 2,000 pounds; frame, channel steel pedestal type, with full elliptic springs, front and rear; wheels, 36 inch artillery, 14 spokes, 3½ inch Turner solid rubber tires; battery, 44 11 M. V. Exide cells, disposed in four trays in underslung angle iron frame, removable from either side; two motor drive; motors, G. E. type 1004; radius, 35 miles on charge; speed, 10 miles an hour; standard direct connected controller, four speeds ahead and two reverse; two 8 candle power electric side lamps; one 8 candle power lamp under canopy; canvas covered top, with side curtains; price, $2,600.

Electric Delivery Wagon for the Adams Express Company.

A German Motor Tractor.

The Neue Automobil Gesellschaft, Berlin, whose gasoline motor trucks were described in our Commercial Vehicle Number, also builds a combined truck and tractor equipped with a gasoline motor. A view of the tractor with trailer vehicles attached is shown herewith. The combination is intended particularly for military purposes and has repeatedly been tested by the German army authorities. On May 13 demonstrations of the practicability of the vehicle were made on the Tempelhofer Field, the military training ground near Berlin. The tractor on this occasion carried a load of 3 metric tons and the two trailers each a load of 6 metric tons, and this combined load was moved without difficulty on sandy and soft ground, we are informed. The rear wheels of the tractor were provided with crossbars of channel steel of a length about twice the width of the regular tires, projecting beyond the tires on the outside and fastened to an internal ring at their outer extremity. The flanges of these channel steel bars sinking into the ground prevent slipping. On paved roads these traction devices are, of course, taken off the wheels.

In exceptionally difficult places the tractor is run ahead and held in position by the brakes and the trailers are drawn up by a windlass operated by the motor of the tractor.

Motor Garbage Wagons for New York.

With the approval of Commissioner Woodbury, of the New York Street Cleaning Department, and William S. Clarke, his Brooklyn superintendent, a motor truck is soon to be experimented with for hauling Brooklyn garbage. The vehicle to be used,

Train of Goods Drawn by Neue Automobil Gesellschaft Tractor.

ch is now building in the shops of Shad-lt & Co., of Brooklyn, in accordance ı plans furnished by the Wood Vehicle ıpany, of Brooklyn, is to be an 8 ton m truck, especially designed for the pro-:d use. Although details and specifica-s are not now obtainable, it is under-d that a flash boiler will be used in con-ion with a burner designed to use either le oil or kerosene. The engine is to be the three cylinder, 120 degree, single ıg type. A speed of about 5 miles an r is expected.

he officials of a number of large cities : written letters to the New York de-ment for details of the coming test, and ı to await results with much interest. :ature that will make the experiment of icular value, from the commercial dpoint, is the fact that the builders of truck will be required to enter upon the ılar work of garbage hauling at the ent contractors' rate, and establish the ty and economy of their machine upon basis.

successful result in so important and :ting a service will undoubtedly lead to e purchases by the New York Street ning Department and materially ıgthen the status of the commercial ımobile with private users. Superin-ent Clarke is authority for the state-t that, in the 78 square miles of terri-in his jurisdiction—including nearly miles of paved streets—the horse drawn ıage wagon shall be superseded by me-ıical power as soon as the change can ıroved commercially desirable.

Trade Literature Received.

onarch Manufacturing Company (Lu-ating Department), Toledo, Ohio.—Lu-ating Oils and Greases.

ord Motor Company, Limited, 688-692 :k avenue, Detroit, Mich.—"The Ford," 'o cylinder, medium weight gasoline car.

oodyear Tire and Rubber Company, on, Ohio.—"How to Repair Tires."

Stevens Arms and Tool Company, :opee Falls, Mass.—Catalogue of the 'ens-Duryea automobile.

Wheeler Manufacturing Company, 10 imore avenue West, Detroit, Mich.—:ular of a detachable dos-à-dos seat for automobile having a flat top to body in of seat.

. R. Thomas Motor Company, 1200 gara street, Buffalo, N. Y.—"A Sure d to Success." Relates to the Thomas obi.

lectric Vehicle Company, of Hartford, ın.—New catalogue of Columbia elec-and gasoline vehicles.

helsea Clock Company, 16 State street, ton, Mass.—Circular of dashboard ks, marine clocks, etc.

A. Weston Company, Syracuse and estown, N. Y.—"Ball Bearing Wheels Parts for Automobiles and Carriages."

he Goodyear Tire and Rubber Com-y, Akron, Ohio.—"Some Accessories :orcarists Will Appreciate." (Tire re-outfits.)

LESSONS OF THE ∴ ROAD ∴

Road Experiences.

By a Preacher.

I have read many experiences of doctors, mechanics, capitalists and just common men, but have not yet read a single communication from a preacher in The Horseless Age. I suppose few ministers have dared to try to manage this modern traveling machine—the auto—but among this small number it seems to me at least one should dare to show his ignorance and his lessons of wisdom learned by sad experience.

Having for a great many years been capable of managing a locomotive or stationary steam engine, I felt quite a desire to possess an auto and thought I could easily master it. The money necessary to purchase a machine had been slow in accumulating, but after staying for a week with a gentleman who had a steam machine, the "fever" got so high I felt I must have one no matter what the cost. I began to watch the advertisements in Chicago papers and wrote to several parties. One owner who wanted to sell stated his machine was in "perfect order," and a great bargain at "only $400 spot cash," it being an 8 horse power stanhope of the 1900 pattern. Some steam machines being offered at very low figures, I felt inclined to buy, until I consulted an auto dealer in a neighboring city, who said it cost much more to run by steam, and they were harder to keep in working order. The dealer also was open hearted enough to say that the machine I had been offered for $400 was certainly a good make and cheap if in "perfect order."

The fever was now at white heat and I telegraphed the owner to hold machine and meet me with it the next morning at the depot, so I could see it go. He met me at the depot, but gave as an excuse for not bringing the machine out that it was in the second story of a paint shop and would be hard to get out. Knowing nothing about the vehicle except the general appearance and the manufacturer's reputation I gave the owner the check for $400. The last caution of a dear friend at home had been: "Remember, Chicago is the Windy City."

How this owner's tongue unloosed on the before unmentioned subject of the "defects" of the machine. He frankly told me I could not think of running it home; in fact he had been much troubled in running it, and had really sold it because it cost so much to keep it in repair, having just paid a bill of $65 for repairs. I also found he was afraid to inflate the tires so as to keep them from rim cutting in going to the railroad depot. Thoroughly discouraged I tried to play the baby act and "back out," but he had just deposited the check in bank and said a trade was a trade. My pocketbook had still less money in it when I found the freight on a 1,650 pound machine for 300 miles was $16.

After over two hours' work at the depot I saw the auto properly fastened in a car for shipment. Not having had a regular meal for twenty-four hours, I got a good square dinner at the Palmer House and started for home, a sadder but a wiser man! The machine arrived safely in a few days at my home, and great was the anxiety of my boys to see it. The whole community was a little stirred that the Methodist preacher should be the first man in that community to buy an auto. Some wondered if he was growing rich, as he had money enough to buy "the toy of the millionaire."

The next day a friend, who was used to running a gasoline engine, was asked to help me start my machine. We filled the gasoline tank and turned the starting crank until we were tired. We then took off a wire, and found by touching it to the machine near the other wire we got a good spark. We then tried by guess moving the contact points, and found we had an occasional explosion, and by moving them still more found the explosion somewhat better. I had learned from the former owner the use of the levers, gasoline foot button and brake.

Running the engine idle for a while I dared the man helping me to get in and try a ride with me. We made little speed and even stopped twice in the street for the crowd that gathered to laugh at us. I then learned that a neighbor of mine had some years before purchased a $1,500 machine and could not use it because it frightened horses so badly with its noise and because of its breaking down almost every time he had tried it, so that for many months he had not tried to use it at all.

I was now discouraged to the last notch, but a new thought came to me—to master that machine or die a-trying. Putting on the oldest clothes I had I went at it, determined to know what was the matter. I had on purchasing the machine written the firm that made it, asking for instructions how to run it, which they kindly sent; but they could not expect in a little book to tell all that a man must learn by reading a good paper like The Horseless Age, as well as in the costlier and slower school of experience. I also purchased a book telling how to run a gas engine and studied the principles involved.

SOME OF THE DEFECTS.

The chain I found to be almost worn out, and I got some extra links and riveted old ones. My clutches slipped, and to make them take hold I wiped the oil off of them, which helped them for a time; but all the dish was ground off the friction planes, so that I could not make them hold at all. The makers very kindly answered every letter and told me to put one-sixty-four inch dish in the friction plates and have them returned and roughened.

Fortunately my old tires did not have a

single puncture in over five months' use, and one that got a slow leak was made to hold all right by a package of "Never Leak" (glucose, I have been told, is just as good at one-tenth the cost).

My greatest trouble I could not find for several months. At times the machine would work fine, but when I would take my wife or friend for a ride it would every time bring me to mortification, so that my wife got afraid she had "hoodooed" it, and did not want to ride with me, for fear we would have to drag back home on the slow clutch, or stop in the presence of a large crowd in the street for them to laugh at us. Tracing the difficulty down step by step I found that the gasoline flow was irregular, and that when the tank was full it would run the machine at a good speed, but when the gasoline got low, would not give enough to supply the machine. I tried to regulate this flow by opening the valve leading from the gasoline tank only one turn when the tank was full, and when the tank was almost empty opening it four rounds.

Explaining again to the makers, they told me a little spring just behind the gasoline needle was weak from long use, and when the full tank pressure was on it made it leak. I pulled the coils of the spring apart so as to strengthen it, and found my flow of gasoline was then regular. I found some trouble still, and on opening my carburetor found the whole inside mechanism had been deranged some time by an explosion, and gave $12 for a new one.

I now felt so confident I had "conquered the thing" that I arranged to take my friends to a neighboring city for a jaunt. Three miles were scarcely passed when I found my batteries were too weak to go further. While working to get it going I heard a noise a half mile down the road and found my neighbor was out trying to make his old machine work. He had possibly been encouraged to try to master his auto by my persistent efforts. He kindly loaned me a few cells of his battery and I got my machine home. I now put in a double set of batteries, five in each set, so that one might rest up while the other was working.

Next my sparking points wore out, and thinking to fix them myself I purchased $2 worth of platinum and put it in, and found too late that the manufacturers of my machine would have given me new silver plugs for 25 cents apiece.

A DRY CYLINDER.

I now felt that my troubles were at an end and had some very fine trips. A friend from a distant city coming to see me wanted to have his first ride in an auto. All went well until a few miles out in the country, when notwithstanding my engine would explode regularly and with strong report, I could not use my fast clutch at all, but had to bear the chagrin of pulling my friend slowly down back streets to my home. Talking to a gas engine man next day, he said he had had great trouble with the gas engine oil I was using, and he told me where I could get good oil.

I found a dry cylinder had caused my trouble, and after cleaning the piston and cylinder, my new oil worked finely.

I now have such a knowledge of every part of the old fellow that I can detect a wrong thump or grating and locate it easily. Many are the trips of exquisite pleasure we have had, and my wife now feels she can hoodoo it no more. I have scored another victory this week. Seeing a spark advancer on a machine, I found I could put one on mine, and in less than three hours' work I had it in good working shape, and find it increases the speed of my machine about 5 miles an hour.

I put a seat on top of a tool box, just in front of the dash, and can now carry four passengers. My experience and facts learned have been worth more to me than all my trouble, and I find by doing my own repair work it is cheaper than a horse would be. With a woman's persistency, my wife at times wishes she had the old family horse back, for she says with the auto you make your trip of 10 or 20 miles and are back before you fully realize you are gone. My boys are my fast partners, and hardly ever draw back, unless I get on a down grade and go at a two minute clip, when they tremble a little; but are ready to try it again the first opportunity.

My advice to any green hand, as I was, buying a second hand machine is to make the owner run it far enough to show you it really is in working order. This is the more imperative if you purchase in the "Windy City." I suppose New York owners can all be trusted.

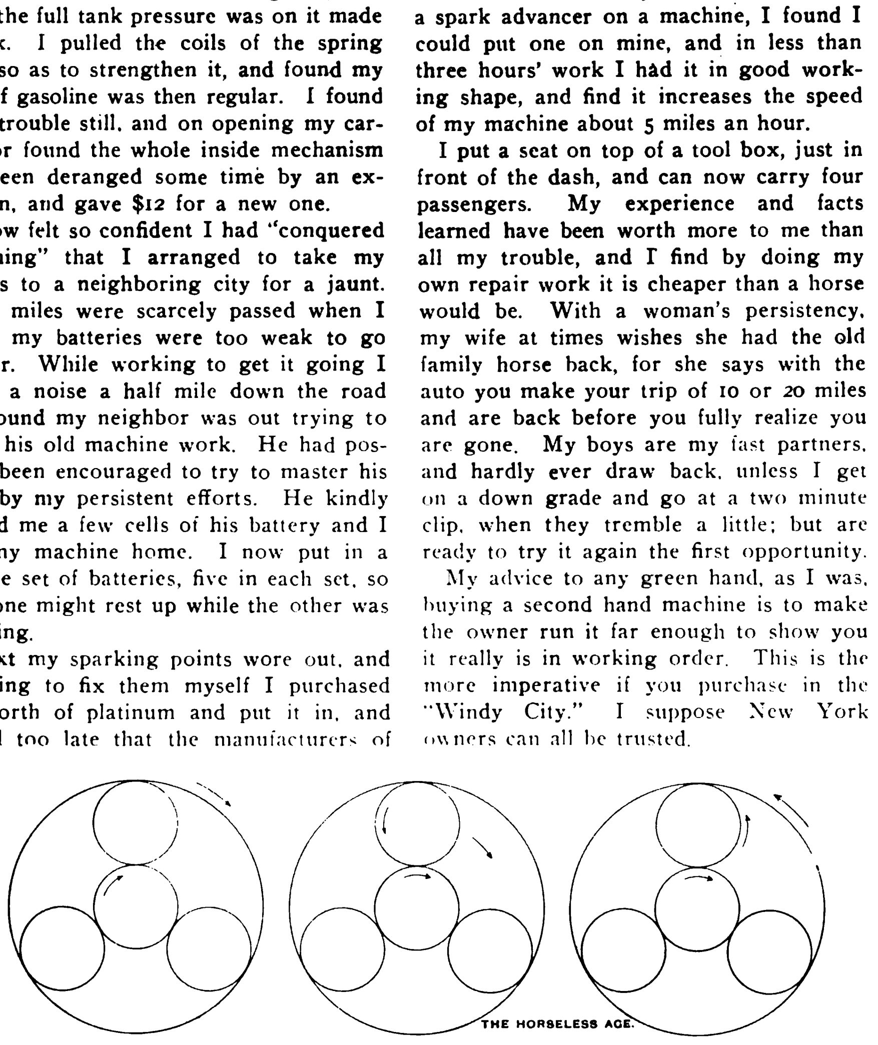


FIG. 12—DIAGRAM OF DURYEA CHANGE GEAR.

High speed—all gears locked together.

Low speed—4 to 1 reduction. Internal gear is held and the idler frame moves forward slowly.

Reverse — 3 to 1. Idler frame held and internal gear moves backward.

The Duryea Cars.

(Concluded.)

THE TRANSMISSION GEAR.

The transmission gear consists of a single planetary system having the central steel pinion screwed on the end of the crank shaft, the three idlers mounted on a frame which permits them to revolve around this pinion and an internal gear surrounding the idlers; with one positive and three friction clutches by which the desired results are obtained from this single nest of gears. By reference to the diagram (Fig. 12) it will be seen that locking the gears together causes them to be carried along with and at the same speed as the flywheel. Holding the internal gear ring will allow the idlers to travel in the same direction as the flywheel but at less speed, which produces the slow speed forward; while holding the idler studs will cause them to drive the internal gear ring backward, thus giving a reverse direction.

In the sectional view (Fig. 13) A is the pinion on the crank shaft; A' is an idler on its stud and X is the internal gear carrying a friction ring B'. This friction ring B' is gripped externally by a band and internally it has a coned surface, which, with its complementary half E grips a bronze ring carried by the sprocket journal casting D. Tightening the external band holds the internal ring from moving and gives a slow speed forward, while causing the parts B and E to approach each other, grips the sprocket journal frame D, and since the idler frame B is normally locked to this sprocket frame by pins P, the ring gear and the idle gears can have no motion; so all parts travel with the flywheel, thus giving high speed.

By means of a lever M the pin P may be withdrawn, leaving the idler frame B free from the sprocket journal frame D. This lever M is operated by the first friction of the reverse band when tightened upon the reverse ring H and further tightening of this band holds the ring H and the idler frame B to which it is attached. This drives the internal gear with its friction ring B' in a reverse direction, and on tightening the high speed clutch carries the sprocket with it. The high speed clutch surfaces are caused to engage by three wedges C which are pushed under rollers by means of toggle links G carried by the shifting collar F, which in turn is operated by a ball bearing F'. Suitable levers, of course, are provided for the reverse, low speed and high speed clutches, the reverse lever being a heel pedal on the floor of the vehicle, while the high and low speed clutches are set by the controlling handle.

The entire transmission gear is extremely narrow, being but 5 inches from the spoke of the flywheel to the centre of the sprocket. The friction surfaces are 10 inches in diameter by 1 inch face for the high speed clutch and 12 inches in diameter for the low speed. Bronze bushings, "metalined," are provided for all bearings and need no oil, a little dry graphite being

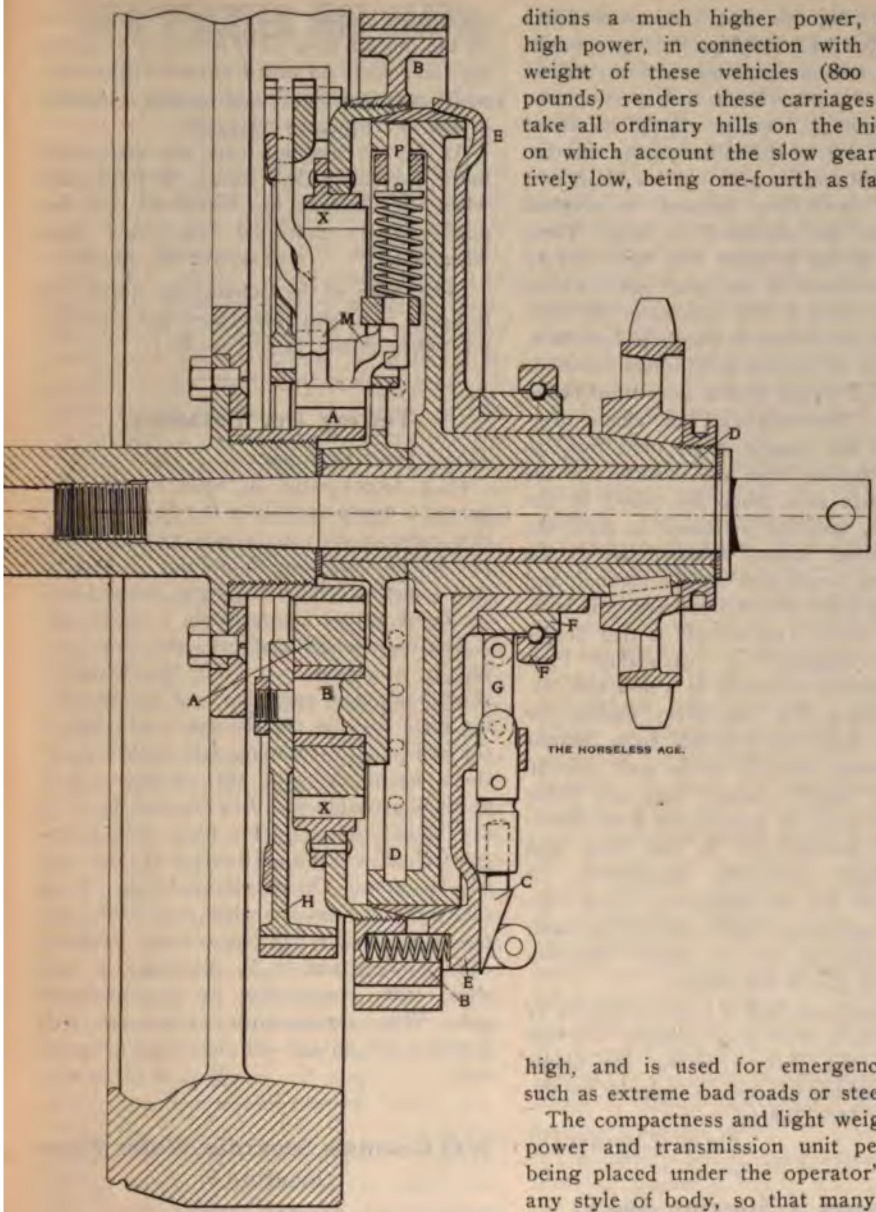


Fig. 13—Change Gear.

advisable occasionally. This freedom from oil insures cleanliness and prevents accumulation of dust and dirt, making it unnecessary to house the gearing and permitting ready access and inspection at any time. Removing the end bearing permits the removal of the sprocket nut with easy interchanging of sprockets. Unscrewing the crank shaft extension permits the entire transmission gear to be lifted out of the vehicle in a few minutes. Various sizes of front sprockets are provided—the usual number of teeth is eight for a rear sprocket of thirty-three teeth—thus gearing the vehicle to suit the roads over which it must travel. The ring B is provided internally with screw threads by which its friction surface may be adjusted to provide for wear of the high speed clutch, it being necessary to loosen one screw for this purpose. The slow speed band is likewise provided, with accessible screw adjustment.

The triple cylinder motor of 4½ inches bore by 4½ inches stroke, while rated at 8 to 10 horse, gives under favorable conditions a much higher power, and this high power, in connection with the light weight of these vehicles (800 to 1,100 pounds) renders these carriages able to take all ordinary hills on the high gear, on which account the slow gear is relatively low, being one-fourth as fast as the high, and is used for emergencies only, such as extreme bad roads or steep hills.

The compactness and light weight of the power and transmission unit permits its being placed under the operator's seat in any style of body, so that many different styles of vehicles are turned out, using the same mechanism, excepting the water tanks, which are built to suit the vehicle.

TRANSMISSION CHAIN (FIG. 14).

The Duryea chain is an ordinary block chain with a felt oil receiving chamber in the centre of each block which, being filled with oil absorbent material, lubricates the chain rivets at their centres with clean oil, and tends to carry the dirt outward rather than inward. The felt projects slightly from the chamber, contacting with the surface of the sprocket, which both deadens noise and prevents wear. This feature is claimed to remove the most potent objection to block chains.

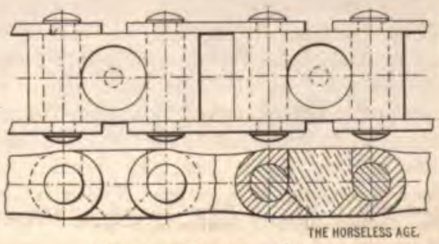


Fig. 14—Duryea Chain.

COMMUNICATIONS.

Fuel Consumption of Steam Cars.

Editor Horseless Age:

In reply to T. J. F. re fuel consumption, I would like to say that I think I have a good idea for saving gasoline. I always got better results than your correspondent, and I believe that I get 4 or 5 miles more out of a gallon of gasoline than before putting my fixture on the burner. I came to the conclusion that the wind forced the fire away from the boiler, either by side or under draft. To offset this I made a hood for the burner and slipped it upon the burner and boiler so the bottom was about 3 inches from the bottom of burner. If it interferes with the chain, brake rod and radius rod, provide an opening for them to run through. Punch the bottom of the hood full of holes to admit the necessary air; put a good coat of asbestos around the sides to keep out draft, and you have it.

In this way cold drafts are kept out and the air consumed is partly warmed before reaching the fire, and in my experience much less gasoline is used.

Do you think it necessary to use oil or any other substance in carriage boiler to prevent decay? A. W. M.

One Cause of Leaky Throttle Valves and the Remedy.

Editor Horseless Age:

An article printed in a recent issue of The Horseless Age recalled to mind an experience in the summer of 1900.

Having a well known type of steam carriage equipped with main and auxiliary throttles the writer one day noticed that with both throttles closed the carriage was still moving slowly. Being near home at the time an investigation followed and brought out the fact that the auxiliary throttle was provided with a disk of some substance resembling hard rubber in appearance, though probably not in composition. This disk being subjected to wear and intense heat had chipped off in one spot and this chip had passed on with the steam to the next throttle and lodged in the seat of the second throttle, so that any attempts at closing the main throttle only held the obstruction more tightly in the seat. This chip, which caused a leak in the first throttle, prevented the closing of the second, and both were disabled.

A new disk of the same substance was substituted and all went well for a time, but the experience was most valuable, for some months later, while on an extended tour, in attempting to slow down it was found that the carriage did not respond to the throttle. The auxiliary throttle was then resorted to, but with no appreciable result. An exciting state of facts was developing. Fortunately the road was good

and there was time as well as occasion for thought.

The former experience suggested that the same conditions were present and the following remedy was applied. The auxiliary throttle was opened wide and the main throttle was given two or three quick impulses and then quickly closed. The result was satisfactory. The obstruction passed on with the rush of steam and on closing the throttle the carriage stopped.

Not having thoroughly enjoyed the experience, however, and remembering the old maxim relative to "an ounce of prevention," information was sought and it was learned that disks of a certain composition of metal can be purchased to fit these same valves at an outlay of 20 cents. One was inserted at once and, notwithstanding some doubts of its reliability, it has in the last three years never caused uneasiness for even a second. The cars of several friends have developed the above symptoms in a less degree. One of these was in the stable at the time and was run against the partition in order to stop it. The owner has since substituted a metal disk.

I am surprised that not all auxiliary throttles are thus equipped at the outset and believe that a warning note should be sounded, for though seemingly a small matter yet dire consequences might result.

H. S. B.

Where the Fault Lies.

Editor Horseless Age:

The article by H. B. Haines on an "Involuntarily Prolonged Trip" so evidently fits a vehicle of Duryea design that there can be no mistaking it. Since, however, the vehicle described was not built by the writer nor under his control, some facts relating thereto may be of interest both to Mr. Haines and the public at large.

In my many attempts to get the needed capital for manufacturing purposes I arranged with a bicycle factory doing a good business to make Duryea vehicles. I particularly described to them the failures made by two previous parties, who insisted on spending their money in wrong directions, and hoped with these examples in front of them that this concern would utilize such experience as I had had to the best advantage and turn out vehicles at least as good as the design called for, if not better. They, however, refused to accept my experience and advice and proceeded to "improve on rational and established lines" many details of the vehicle, with the result that each succeeding vehicle grew worse instead of better, heavier instead of lighter, and less efficient instead of more so, and with the final result that they went out of business fully three years ago. The blue prints furnished them showed a flywheel weighing less than 100 pounds instead of 250 pounds, as described by Mr. Haines, which additional weight was one of the so called "improvements."

It may interest the public to know that we are driving this same size motor today with a flywheel weighing but 55 pounds and that we consider the results obtained therefrom far superior to that given by the heavier flywheel, because of the increased responsiveness of the motor to the throttle.

The transmission gear was an "improvement" of their own, because the original design was too expensive to build. Their liberality in the flywheel was equalized by parsimoniousness in the gear teeth, which, instead of being 1 inch face, as in the Duryea design, were but five-eighths inch face, and instead of having three idlers constantly in mesh a single sliding gear transmitted all power. The weight of the vehicle, originally but 850 pounds, grew until fully 50 per cent useless iron was added, but the original size axle, none too heavy in the first place, was not increased to meet the requirements. Almost every detail of the vehicle was "improved" in like manner, and it is no wonder that the concern quit business at a loss. The wonder is that people of good judgment in established lines should blunder so widely in a new line, especially when they had every facility for making a fairly good article from designs and drawings already fairly well proven. With the slight changes that are being made each year, of course, the same drawings and patterns are in use today and give results eminently satisfactory or they would not be continued. This subsequent experience clearly proves the fault to have been in the so called "improvements" and not in the design.

This being true, and it is easily proven by comparison, I trust your readers will not attach to the Duryea system the blame properly given to such a vehicle as described by Mr. Haines.

Chas. E. Duryea.

Requires a Steering Check.

North Easton, June 8.

Editor Horseless Age:

Will the editor or some reader of The Horseless Age kindly inform me the best and neatest steering check for a side steering machine, weighing about 1,600 pounds. I find I am in great need of one, as the side thrust and jar are very noticeable on rough roads.

E. M. Carr.

Ferry Regulations in Philadelphia.

Editor Horseless Age:

The note on page 692 relating to a notice given by Government inspectors of steam vessels is erroneous. The fuel does not need to be removed from the automobile before crossing a ferry in Philadelphia. Upon reaching the ferries, in case of a steam machine the fuel must be cut off from the burner, including the pilot light; in case of a gasoline machine the battery must be disconnected from the spark circuit, and in either case the machine is pushed onto the boat by hand. The driver or his friends usually push the vehicle aboard themselves, but if the former is sufficiently persuasive he may induce the deckhands to do the job for him. The necessity of pushing the vehicle on board is rather annoying when the tide is low, as in that case the bridge is frequently very steep.

As far as gasoline cars are concerned there is certainly less danger to the public when the batteries are connected and the machine runs under its own power than when not.

Clarence W. Moore.

[The order of the Government inspectors has only just been issued and has probably not yet been put in force.—Ed.]

Testing Dry Batteries.

Editor Horseless Age:

In a recent issue of your journal appeared a query as to how to tell when ignition batteries are run out and why they will not do the work they should do. A battery will sometimes show the right voltage and yet be of no use for operating a spark coil.

The only instrument necessary for testing is a voltmeter. First the batteries should be put in operation, say, by connecting them so as to run the spark coil. While the cells are discharging test each one of them separately with the voltmeter, and you will probably find that some of the cells are "dead" and not doing their work properly, which will put all the rest of them out of business. Often automobilists think their cells are run out when they have only one bad cell or a bad connection. When a cell is weak and is on discharge it will show from one-quarter to three-quarters volt. When the pressure is below one volt a cell is of no use for operating a spark coil.

Wm. B. Dodge.

Will Chamois Separate Water from Gasoline?

Editor Horseless Age:

In a little book compiled for the Peerless Motor Car Company by Charles G. Wridgway it is stated that if in filling the gasoline tank the gasoline is poured through chamois leather this will effectively separate any water from the gasoline, as well as retain any dirt.

If this device is as effective as Mr. Wridgway claims, it would seem to the writer that a general knowledge of the fact would be appreciated by automobilists.

Henry Van Arsdale.

[If any of our readers have tried chamois for this purpose we should be glad to learn what success they have met.—Ed.]

Dr. Henri de Rothschild while returning from Bordeaux to Paris on May 30, when nearing the village of Petite Touche, ran into two young men on horseback. The automobile overthrew one of the horses, broke its two front legs, and hurled the rider violently to the ground. The automobile was smashed to pieces, and was pulled by two oxen to the nearest railway station, where the party took train to Paris.

EW VEHICLES AND PARTS.

"Columbia" Five Ton Four Motor Truck.

ie new "Columbia" electric truck, of h the accompanying half tones are il- ations, was designed for the Electric icle Company by its electrical engi- , Mr. Alden, for the transportation of ls in crowded centres where the traf- ; of an intricate nature and the service for a vehicle that can be readily con- ed under the trying conditions which traffic imposes. The truck proper mbles a horse drawn truck of the w York gear" type very closely, hav- been built on the general lines of a vehicle. It has no metal frame and it in need of heavy framework, as the orm only suspends the paying load the batteries. The four motors are ed by the running gear and do not n the woodwork under the platform 1 running. This woodwork consists mbers that are shod with steel bands. er the platform a number of heavy es are hung, which suspend the bat- s and support the platform.

) permit of the truck being turned nd in as small a space as possible fifth l steering is employed. The problem nging the motors in front was simpli- by the adoption of this horse drawn le detail. In Fig. 2 the front wheels hown turned, so that the axles are at angles to each other. The wagon hen be turned around to point in the site direction (by starting the motors) narrow street of slightly greater 1 than the truck's over all length, pro- l that it stands close to a curb before ng is begun. A complete revolution e whole truck around the inner rear l can be made between curbs that are uite 42 feet apart.

e weight of the truck, inclusive of the batteries, is 12,000 pounds, and 8,500 pounds without the batteries. The over all length is approximately 20 feet, the wheel base is 11 feet 6 inches, the tread 5 feet 10 inches and the over all width is 6 feet 8 inches. All the wheels are drivers and are shod with 36x7 inch Turner endless solid rubber tires. Each wheel has fourteen spokes and large, extra heavy roller bearings. The hubs are of the Sarven pattern. The front and rear axles are solid steel forgings 2¾x2¾ inches and 3x3 inches, respectively. All the springs are of the semi-elliptic type, 50 inches long and 3 inches wide. There are nineteen leaves or plates to the front spring and twenty to each of the others.

The motors are rated at 4½ horse power (maximum) and run at 850 turns per minute. They are of special design and completely enclosed in dustproof cases. Each motor is hung from the running gear by means of links, which permit the chain to be taken up by the distance rods that are secured to the cases of the motors and to the axles. These rods have one pivoted end, which relieves them of all twisting strains to which they would be subjected whenever a road wheel passes into a depression or over an obstruction in the road. On the shaft of each motor a pinion is mounted which drives a large gear of bronze at one-sixth of its own speed. To this secondary shaft a sprocket is bolted which drives the large sprocket of the respective road wheel by means of a 1½x¾ inch roller chain. The large sprocket is bolted to the spokes of the road wheel by means of clips which are located near to the felloe, so that the spokes are strained but very little. As each wheel is driven individually there is no need of a balance gear.

The battery box is slung below the platform, as shown in Fig. 1, and is hung by the company's method, which embodies the three point support principle. It is claimed that this box can be removed by one man, and that all warping and twisting of the battery box are avoided by the method of suspension. The battery consists of forty-four Exide cells of 280 ampere hours capacity, which are capable of driving the truck with a load of 6 tons at the rate of 6 miles an hour at a wattage of 35 per 1,000 pounds mile, the manufacturers state. To simplify the loading and unloading of batteries automatic contacts (a special feature of "Columbia" electric machines) are employed.

In the box under the driver's seat the motor which is used for steering purposes is located. At both ends of its shaft a jaw clutch member is mounted. One of these drives the steering gears and the other operates a winch for hoisting purposes when in engagement. The steering mechanism consists of a worm which meshes with a worm gear, a large pinion on the same shaft to which the worm gear is secured, and a gear crown that is bolted to the fifth wheel. The latter is equipped with rollers to reduce friction to a minimum.

The control devices are exceedingly simple, and therefore readily manipulated. A hand wheel actuates the contact brushes and controls the four forward speeds, the three reverse speeds and the electric brake, which acts on all four wheels so that skidding is avoided, or rather prevented, as soon as the brakes are applied. A hand tiller is provided for steering purposes and controls the motor under the driver's seat. As soon as the front wheels are turned until they point in the direction of the tiller the motor ceases to work. Obstructions in the road cannot deflect the front wheels, i. e., change their angular relation to the platform. The interposition of a worm gear device in the steering mechanism makes the gear irreversible or of the locked type. A foot pedal is fitted to the wagon which applies the expanding ring brakes with which the drums of the large sprockets of the rear wheels are fitted. These rings are faced

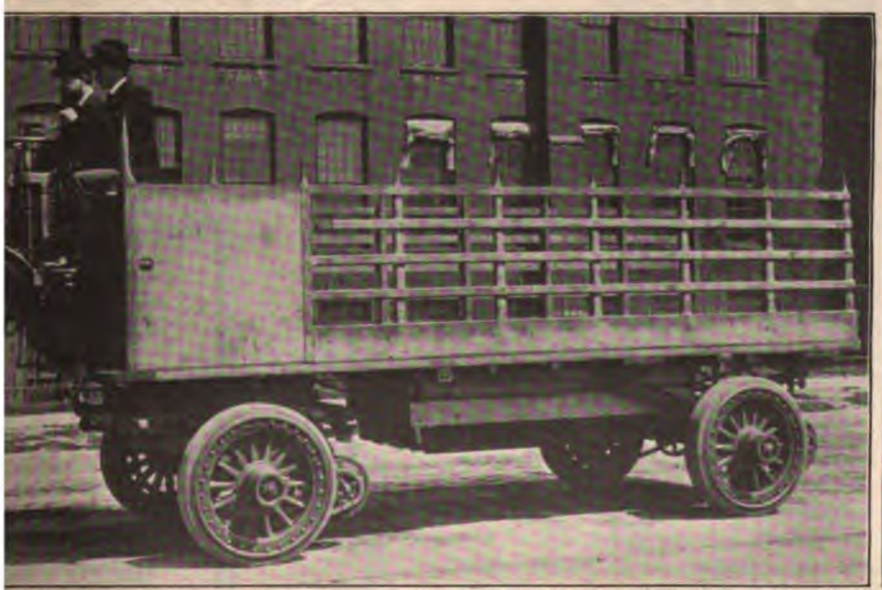


FIG. 1. COLUMBIA ELECTRIC TRUCK. FIG. 2.

with wood, and provision is made for taking up wear.

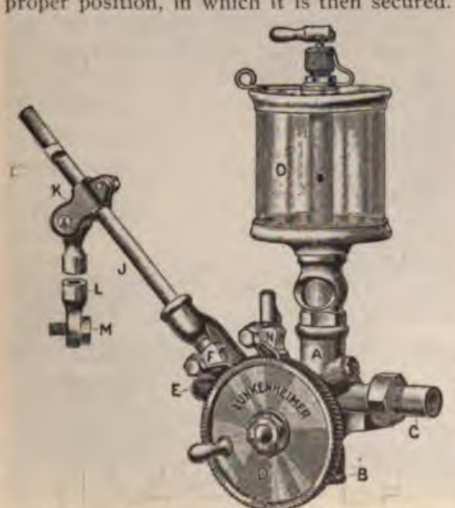
A feature of the truck which has been well taken care of is that of control when making more or less sharp turns, which are at times desirable and which can easily be made with a fifth wheel. With rear drive, only, the propelling wheels tend to make the front wheels slide over the ground when sharp turns are made. The tires and their fastenings are then subjected to great strains and excessive wear, and if resilient tires are employed chipping will soon set in. In the truck which forms the subject of this description the power is automatically thrown off of the rear motors as soon as the front axle is turned 45 degrees from the neutral position.

The platform measures about 16 feet by 6 feet inside the stakes. As all the road wheels are power driven the weight distribution need not be uneven; that is to say, the rear wheels do not require more weight in order to secure proper adhesion to the road surface. With approximately even weight distribution the tires should all wear with an equal amount in a given time. Drivers of this class of vehicle are prone to loading them unevenly, i. e., they load down the rear wheels more than the others, whenever loading is done from the rear, for an obvious reason. The springs in the rear of this machine are, therefore, of a slightly heavier type than those in front, to resist excessive deflection.

The Lunkenheimer Mechanical Oil Pump.

The accompanying engraving illustrates one of the most recent products of the Lunkenheimer Company, of Cincinnati, Ohio.

The driving mechanism of the lubricator is of the ratchet type, as shown. Coupling M is provided to attach the operating members to some reciprocating part of the engine. Motion is transmitted to J by means of a link (not shown) and to the piston E by means of a crank pin device. The amount of oil fed can be regulated independently of the feed from the oil cup by moving the block K along the rod T to its proper position, in which it is then secured.

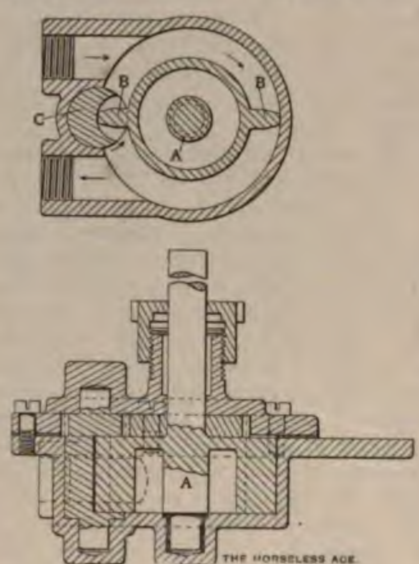


LUNKENHEIMER MECHANICAL OILER.

Should it be desirable to feed a quantity of the lubricant into the discharge pipe it may be done by turning the crank. The ratchet wheel D and the pawls F and N are of tool steel and all the castings are made of a hard bronze alloy.

Ball's Positive Circulating Pump.

Frederick Ball, of the New York Gear Works, 59 Milton street, Brooklyn, N. Y., has just brought out a circulating pump



BALL'S CIRCULATING PUMP.

which is claimed to be of positive action. In the accompanying cut this pump is shown in two sections, the upper being a plan view and the lower an elevation.

A is the shaft and vane, which are of one piece of bronze. There are two projections B B to this casting, which constitute the vanes proper. Built into the pump is a rotary valve which is driven by an integral pinion that meshes with the gear on the vane shaft and makes twice as many turns in a given time as the latter does. The pump body is provided with two hubs which are tapped and afford means for connecting up the pipe system.

The water may enter the pump through either of the hubs, provided the vane is revolved in the corresponding direction. The action of the wings B B and the rotary valve C on the water is similar to that of the gears on the liquid in a gear pump. The wings and the rotary valve do not come in contact with each other, nor do the wings rub against the inner annular wall of the pump. Hence these parts do not wear. One end of the vane shaft revolves in a bushing of "anti-friction" metal, which is said to require no lubrication. As all the journals and the pinions run in water no oiling is required.

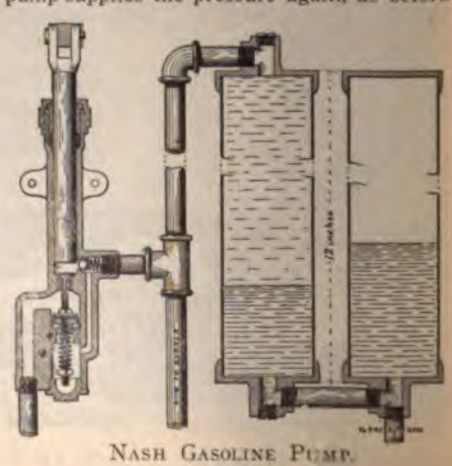
The makers state that the pump will charge about 4 to 5 gallons of water a minute at 400 revolutions, according to the back pressure created by the resistance in the system. All the parts are of bronze and the complete pump weighs about 6 pounds. On the vane shaft a sprocket or gear may be mounted in case direct drive off the cam shaft is not adopted. To guard against the unscrewing of the stuffing box nut a spring (not shown in the drawing) is provided that catches in the notches with which the spanner wrench engages.

When running at high speed it is claimed this pump will discharge water at 100 pounds per square inch.

Nash Gasoline Pump.

The Nash gasoline pump for feeding gasoline to the burners of steam carriages has several features in which it differs from other appliances of the same nature. By means of two small cylinders it does away with the necessity of pumping air into a large pressure tank, and by the use of this pump the gasoline can be carried in a large tank without being under pressure. When the pump is put into operation the nut on top of one of the small cylinders is taken out, the cylinder is filled with water, the nut replaced, and a few strokes on the hand lever of the pump will force enough water to partly fill the opposite cylinder, which up to this time only contained air. The air is compressed and forces gasoline to the burner at the pressure to which the adjustable spring is set. A few more strokes by hand will supply enough gasoline to raise steam. As the water partly fills both cylinders when under pressure the gasoline cannot absorb any air and thus loss of air is avoided.

The operation of the pump is very simple. When the piston of the pump is raised the gasoline flows in through the inlet check valve at the bottom of the pump cylinder. When the piston descends the gasoline is forced through the ball check valve to a small pressure cylinder, which carries a little over a pint of gasoline under pressure. Then the pressure of the air in the other small cylinder will drive the gasoline to the burner. When the pump raises enough pressure to overcome the adjustable spring the gasoline in the little chamber beneath the pump cylinder raises a movable disk, which in turn lifts the inlet check valve and the pump then merely pumps gasoline from and to the supply tank until the pressure is lowered. Then the adjustable spring draws back the movable disk and releases the inlet check valve and the pump supplies the pressure again, as before.



NASH GASOLINE PUMP.

Maintenance and Repairs.

VII—Repairs of Common Runabout Engine Breakages

By W. O. Anthony.

With the earlier models of a popular gasoline runabout it would sometimes happen that the nuts at the outer ends of the studs which hold the main bearing caps of the engine in place loosened on the flywheel side, and if the machine was run very much in this condition the studs in the other side were very likely to break, owing to the continual bending at every impulse of the motor. When this happened a permanent repair could be effected, many times, only by a removal of the engine, so that the broken parts of the studs might be drilled out and new studs put in.

This is a very long winded job, and it has happened several times in the experience of the writer that the owner could not or would not tie the machine up in the shop long enough for this, so a temporary repair—which in practice, however, has proven permanent so far as results are concerned—had to be devised. It consisted in extending forward from the bearing cap to the angle iron frame one or more struts of one-half inch cold rolled steel, having a bearing, through a one-half inch nut, upon the crank cap at the rear end, having the forward end rounded, as shown in Fig. 22, and extending through a piece of strap iron, which prevents it from slipping out of place. Two of these struts are shown in Fig. 23 in place upon the engine.

The piece A is the strap iron guide for the end of the two struts, and is made of stuff one inch wide and three-sixteenth inch thick.

This piece is drilled with two one-half inch holes, as shown, and is bent in such a way as to go under one of the nuts which hold the forward end of the crank case to the frame. The forward ends of the struts being rounded, as shown, makes them bear quite evenly and turn freely in tightening, and they will adapt themselves to the angle at which they must be placed.

The lower strut must be bent, as shown, after it leaves the nut. The end of each strut behind the nut is turned down so as to fit inside the hole in the bearing cap, and is allowed to project as far as possible into the hole before the nuts are tightened. If both struts are used a three-sixteenth inch hole should be drilled in each and a piece of wire D, Fig. 23, put through the holes after the struts are in position, and bent over, as shown, to prevent falling out. If only one is used a hole should be drilled in this one and a wire put through it and twisted around or under one of the engine nuts, as at E, Fig. 23.

In practice this repair has been found to work admirably, and may keep the machine in commission until some more serious break compels it to be laid up.

In earlier machines of this same make the lugs F, Fig. 23, would once in a while break off, and a repair was at one time made in the following manner, and was, of course, the means of extending the life of the crank case for an indefinite period. This repair was effected without removing the engine from the machine, but by taking off the body only. Fig. 24 illustrates this repair, B being the point of fracture and piece A being a stud forged out by hand, the end turned down and threaded and the flat portion screwed and riveted to the crank case, by working through the hand hole located on top of the case in the engines of these machines. The broken part, having a threaded hole in it, is run up over the rounded and threaded portion of the new stud, and this forms a support for the bearing cap to abut against.

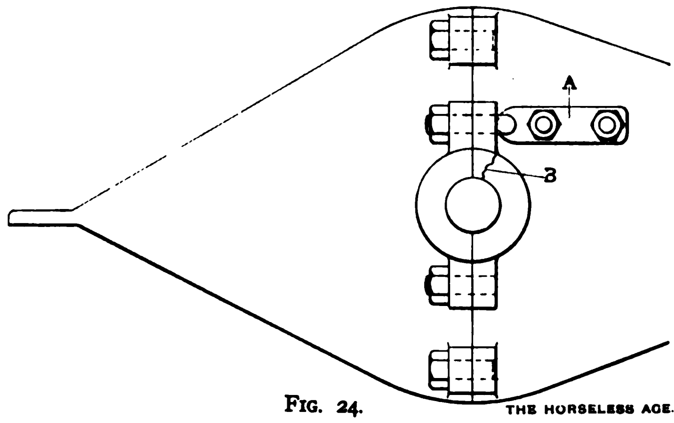


FIG. 24.

The stud is shown more clearly in Fig. 25.

In the same models of this machine there is an air pipe running from the crank case and operating the gasoline pump, which in turn feeds the vaporizer. This pipe would sometimes break off at the point where it enters the crank case, and if this happens upon the road, as it once did with the writer, a man without at least some mechanical training will be at a loss to know how to proceed. Fig. 26 shows this pipe, and it generally breaks off at the point A. In the shop it is a simple thing to repair, it being only necessary to rethread the lower end of the upper piece, and after separating the halves of the diaphragm of the gasoline pump, screwing it back into place. Before this can be done the broken pieces must have been removed, either by inserting a file tang, giving it a light blow, and depending upon its gripping the inside of the pipe, or by placing a small cold chisel against one edge of the pipe and tapping lightly upon it in a direction to unscrew it. One or the other of these methods is quite sure to start the broken piece. Upon the road a piece of stiff wire should be twisted around the pipe at the top back of the elbow, as shown in Fig. 26, and the other end twisted under one of the cap screws C which hold the hand hole cover in place. Then, with pliers, twist the wire until it is taut. If the upper piece of pipe has not been turned the broken ends will go together and make a joint sufficiently tight. Should they not some tape may be wrapped around the break.

Now to prevent the end from jarring out of place upon the road whittle two wooden wedges B B and drive in, as shown, one between the pipe and the water tank and the other between the pipe and the edge of the hand hole plate.

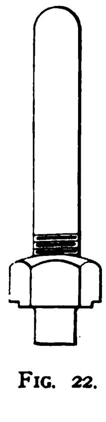


FIG. 22.

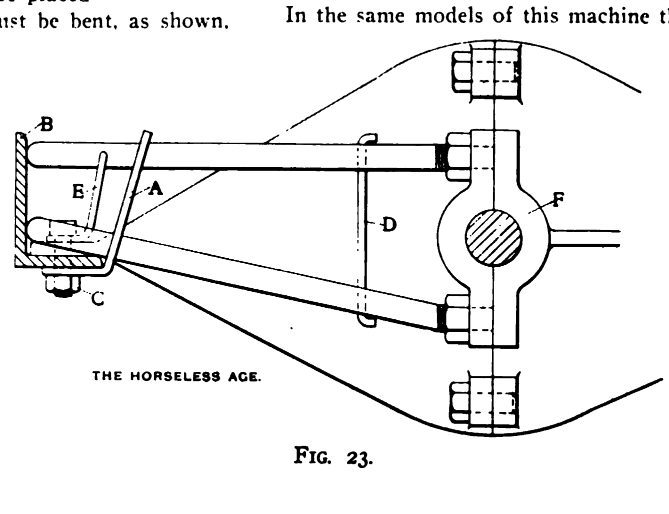


FIG. 23.

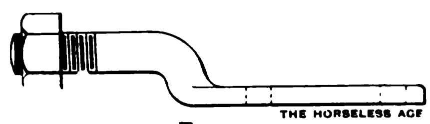


FIG. 25.

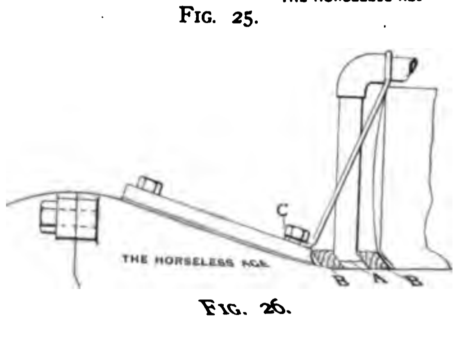


FIG. 26.

The Self Propelled Fire Engine.

By C. H. Gillette.

A question which comes up perennially, and in these horseless days more than ever, has to do with the self propelled fire engine, hose wagon or truck in our large cities. The widespread use of motor vehicles for this purpose abroad and the very patent reasons why they should be available and useful form the basis of a widespread belief that we are getting behind the times. The automobile ambulance and the auto truck are coming to be so largely a feature of metropolitan life that one instinctively asks why the fire fighting machines are still horse drawn.

Yet the facts go to prove that not only have there been exhaustive tests of motor engines, but these engines have been in use in many cities for considerable periods, in some cases so long that it is hard to understand why they have not been permanently retained. They have become a feature of the departments in some cities, but in most places they have been quietly retired, without repairs, after the novelty had worn off.

Investigation seems to show that political conditions, in the main, have been responsible for the continuance of horses in the departments. The use of horses offers unlimited scope for city contracts. Economy in municipal expenses is often the last consideration. The self propelled fire engine, like many other up to date details of municipal service, has had to bide its time. These conditions cannot, of course, continue for many years to come.

The first steam propelled fire engine was completed in 1875 by the Amoskeag Engine Company, of Manchester, N. H. It was sent to New York city and placed in engine house No. 20, situated at 47 Marion street. This engine had a straight frame, was chain driven on one side and had a rather imperfect steering device. Later examples of steam propelled engines had a worm gear for steering and met the practical needs of the fire departments amply. In 1874 the New York department bought four more engines and these were distributed as follows: One to Company No. 8, located at 165 East Fifty-first street; the second to Company No. 11, at 437 East Houston street; a third to Company No. 24, at 78 Morton street, and the last to No. 32, at 108 John street.

So far as can be learned all of these were in use for periods ranging from ten to twelve years, or during the life of the original boiler. Apparently no effort was made to have these boilers repaired or have the engine retained in commission, though there is nothing in the record of the department tending to show that the engines were found lacking in any important particular, in actual work.

These engines were part of what may be termed the first output by the Amoskeag Company, which consisted in all of thirteen machines. The distribution appears to have been as follows: New York, five; *Chicago, two; Boston,* one; Brooklyn, one; Milwaukee, one; Waukesha, one; Hartford, two.

The two sent to Hartford were the first to be steered by worm gears. They were driven by chains on both sides and in various other details their mechanical construction showed forward steps.

In Chicago the engines were changed to horse drawn vehicles a few years after their reception. The city fathers never took the trouble to make clear the reasons for this change. In Brooklyn there was legislation against self propelled vehicles, apparently owing to political bias. In Boston the self propelled engine was in use for a number of years. At the second big fire, an imperfection in the steering gear caused a breakage at a critical moment and the engine ran with great force into a curb, causing such damage that it was deemed best not to repair it again and place it in commission. This was undoubtedly due to a large extent to public opinion at the time, the accident having occurred in the presence of a great crowd, and the impression gained ground that the self propelled fire engine was a very dangerous innovation. The newspapers strengthened this belief.

In 1889 a second lot of self propelled engines was completed. These were much larger than the first batch, and presented many points of superiority over their predecessors. Six of them were built in all. The first one constructed was sent to Hartford, and was considered one of the sights of the town until August, 1901, when a still larger steam propelled engine was sent to the same city. This latter machine was the one which is commonly known as "Jumbo," and which, together with two of those previously sent there, is still in commission. Hartford has at present three steam propelled fire engines, and in this regard makes the best showing of any city in the country. "Jumbo" is driven with a chain and spur on both sides and has a worm gear for steering. Hartford, by the way, is still using the original steamer sent there twenty-seven years ago.

Of this second lot of motor engines the first went to Hartford, the second and third were sent to Boston, the fourth to Norwich and the fifth to Pittsburg. Within a comparatively short time another large self propelled engine has been sent to Portland, Me.

Some idea of the size of the great Hartford machine may be gathered from the statement that it is the largest fire engine in commission in the world except one, a horse drawn engine in Liverpool. This Liverpool machine has a 14½ inch cylinder. "Jumbo," which is, of course, the largest self propelled fire engine in the world, has two upright cylinders, each of 9½ inch bore and with an 8 inch stroke. It has a 5¾ inch pump, with a speed of 400 revolutions per minute, and has been found to be of splendid efficiency in work at fires.

The chief of the Hartford fire department pronounced the self propelled engines to be satisfactory in almost every respect. He freely says that the greatest trouble he has is in securing proper operators, and concedes that this is due to political and civil service conditions. Stationary engineers are sent to act as drivers, and sometimes succeed in running the machines only after months of struggle.

The greatest advantage lies in the fact that the steam propelled vehicle is ready for immediate service at all times. It stands in the engine house with 85 pounds of steam up, which is enough to start it at once when the alarm of fire comes in.

The chief states unhesitatingly that there is great economy in the use of steam propelled engines over the cost of horse drawn vehicles. They need but little more repairing than do the horse drawn machines, and the cost of maintenance is far less. Nothing short of blizzards can tie them up, and then it must be such a storm as would be apt to greatly hinder even the horse drawn machines. At such a time a pole is attached.

Mercedes Factory Burned Down.

The main building of the Daimler Motor Company's works at Cannstadt, Germany, was destroyed by fire on Wednesday, June 10. Six 90 horse power cars and some sixty other ones in the process of assembling were more or less seriously damaged. The patterns and designs were not destroyed and the machine tools are all intact. All work at the factory, which is claimed to employ 850 hands, was temporarily suspended. The Wurtemberg Government offered the use of its locomotive factory at Essling to the Daimler Company, and as this factory is close to the Daimler works the offer was accepted, and operations will be resumed in a few days. The delays in deliveries caused by the fire will not exceed three months, it is said. The damages are estimated at $500,000, but are fully covered by insurance. The fire will have no effect on the participation of the German team in the Gordon Bennett Cup Race. Foxhall Keene, Baron de Caters and M. Jenatzy will each drive a 60 horse power Mercedes.

The Daimler Company has decided to install a branch depot and repair department in Paris, not far from the Arc de Triomphe.

New Incorporations.

Loomis Auto Car Company, Rutherford, N. J.; capital, $20,000; incorporators, Peter T. Davids, Addison Ely, Gilbert J. Loomis and Samuel Squire.

Globe Power Company, of Akron, Ohio; to make automobiles, etc.; capital, $200,000; directors, William F. Hoffman, Elmer E. Hoover and George H. Hoover.

Oldsmobile Company, of New York city; to manufacture automobiles; capital, $10,000; directors, W. T. Rainey, of Cleveland, Ohio; R. A. Rainey, of Lakewood, N. J., and R. M. Owen, of New York city.

...OUR... FOREIGN EXCHANGES

The Sixty Horse Power Mercedes Car

One of the first 1903 model Mercedes cars that were brought to England was a 40 horse power one purchased by Alfred Harmsworth, the London publisher. Mr. Harmsworth, the same as last year, gave representatives of the English automobile press an opportunity to inspect the car, "that English manufacturers might become acquainted with the latest Continental practice," and a lengthy description of the new vehicle appeared in recent issues of the *Autocar*, from which the following is taken.

The greatest deviations from last year's model lie in the engine. The cylinders

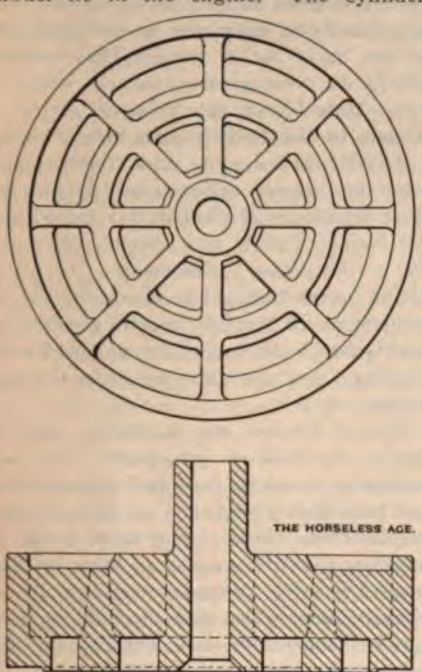


FIG. 1.—MERCEDES INLET VALVE SEAT—SCALE ONE-HALF SIZE.

have a bore of 140 millimetres, and the stroke is 150 millimetres (5.6x6 inches), as compared with 118 millimetres by 150 millimetres in the 40 horse power car. The inlet valves, which are of extraordinary design, are fitted directly into the top of the cylinders.

A section of the valve seat casting is shown in Fig. 1. There are three concentric seats, on all of which the valve must bear properly if compression is to be maintained, and the area of opening is equal to that of a single valve of equal lift and about 8 inches in diameter.

The admission valve is operated by a horizontal lever, which has its fulcrum in a bracket on the valve cover, and is operated in its turn by a long vertical rod from the plunger in the cam shaft casing. This vertical rod at its upper end is cut with a square threaded screw D (Fig. 2), and this engages with a socket E, which forms a knuckle joint on the end of the lever. It will be seen, therefore, that when the rod B is rotated its length is altered, and a corresponding variation is effected in the lift of the valve. In order that the rod may be rotated, it is provided with a toothed pinion C near its lower end, which engages with a horizontal rack rod carried on the side of the cylinder casting, and so arranged that it can be moved in a direction parallel to the crank shaft by means of the lever on the top of the steering wheel. This rack rod engages with the pinions on all the four admission valve rods, so that the lift of the valve can be reduced to any extent while the engine is running.

The exhaust valve has a flat seat and is placed in a valve chamber on the same side of the engine as the admission valve rods, so that one cam shaft operates the whole of the valves. This leaves the other side of the engine quite clear, except for the magneto ignition plugs, which are more accessible than in last year's engine. The carburetor is on the same side as the ignition plugs, and is of the most elementary design. It has no auxiliary air supply, the whole of the air being taken from a hot air box on the exhaust pipe and through the vaporizing chamber of the carburetor, where it passes through the vertical sleeve surrounding the spray nozzle. Immediately above the vaporizer is a simple butterfly valve operated by the governor, which cuts out at about 1,200 revolutions per minute.

The magneto is placed on the opposite side of the engine to the ignition plugs, and a wire conveys the current to a distributer on top of the cylinders. This distributer has four plugs from which wires pass to the ignition plugs, so that either of the latter may be readily disconnected. In addition to the magneto ignition plugs, which give a make and break inside the cylinder, provision is made for ordinary high tension sparking plugs, which may be used in conjunction with an induction coil and accumulators.

The lubricating oil is carried in a small tank hung below the frame directly behind the front wheel. A similar tank on the other side contains the water for cooling the brakes. The oil is forced by exhaust pressure to the sight feed lubricators on the dashboard, whence it is distributed by a formidable array of pipes to the various parts of the engine. The gasoline is carried in a large tank behind the rear axle,

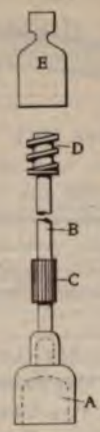


FIG. 2—INLET VALVE PUSH ROD.

FIG. 3—EXHAUST VALVE.

the exhaust pressure being also utilized to force the fuel to the carburetor.

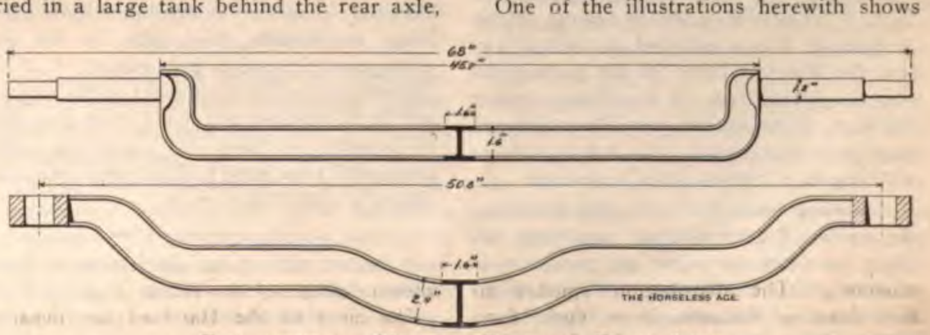
The new gear operating mechanism with cam plate has been applied to only very few machines, and Mr. Harmsworth's car is fitted with last year's control mechanism, in which the gear lever has a lateral as well as a pivotal motion.

To facilitate changing the sprockets, the ends of the countershaft are fitted with bosses having a suitable flange, to which the sprockets are attached by six bolts, and this is found to be much more convenient than the old method, by which the keys were disturbed each time a change was effected. The brakes on the rear wheel are somewhat different, inasmuch as the expanding ring is in halves jointed together, and is anchored to the radius rod, which is made of girder section to stand the stress.

The steering pivots are not inside the hubs, as in last year's models, and are the reverse of the ordinary form, the fork being on the knuckle and the eye on the axle itself. The height of the eye is only 40 millimetres (1.6 inches). The axles are both of girder section. All bearings of the transmission gear and road wheels are of the ball type and without means of adjustment.

The honeycomb cooler is made of square tubes 5x5 millimetres and 100 millimetres long (.2x.2x4 inches). The tubes have very thin walls and weigh in the aggregate less than a pound and occupy a total space 21½x22½ inches. The water is circulated by a centrifugal pump on the magneto shaft.

One of the illustrations herewith shows



FIGS. 4 AND 5.— MERCEDES REAR AND FRONT AXLE.

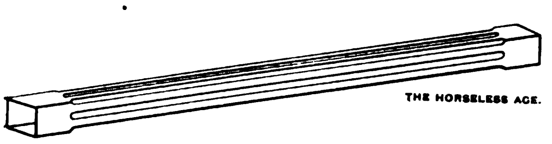


Fig. 6—Tube of "Bee Hive" Cooler.

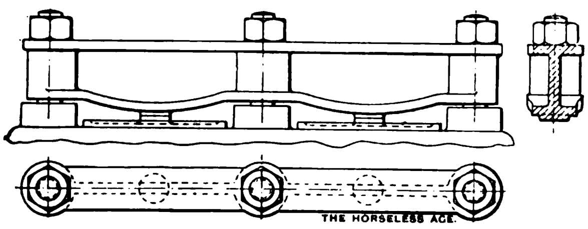


Fig. 7—Valve Cap Yoke.

the valve cap yoke of the 40 horse power Mercedes motor, which is a drop forging and is of girder section, the same as the axles. It is held in place by three threaded studs and nuts. The particular form of this small part shows well the extremes to which designers of racing machines go to save weight. The use of three studs instead of a single one also has for its object the saving of weight, for if all the pressure came on a single stud the anchorage of that stud in the cylinder casting would need to be much more massive.

The new method of hand regulation by which the simple movement of one of the levers above the steering wheel regulates the lift of all the admission valves enables the rider to control the engine very effectively by throttling the incoming charge. It will be interesting to learn whether it is more effective than the simple hand throttle on the 40 horse power. In the case of Mr. Harmsworth's car it has not resulted in economy of gasoline, as the consumption up to the present has been about 1 gallon per 10 miles.

Views of European Automobile Publications on Racing.

Following are some expressions from our European contemporaries given shortly after the Paris-Madrid affair:

"The big cars are not fit for use on public roads at all. To a very large extent the same remarks apply to light cars. * * * The only possible future for racing, if it is to have a beneficial effect on the development of the car, is for certain restrictions as to engine dimensions to be imposed. * * * It is idle to preach against racing, so long as it is conducted in such a way that the life and limbs of the participants only are endangered. It would be a strange world in which no one was allowed to engage in a sport which was not as safe as walking in a country lane."—*Autocar.*

"The accidents * * * are prejudicing the cause of automobilism, and they are likely seriously to impair the prospects of a sport which has already produced splendid examples of manliness, courage and resource, and might, with proper precautions and management, develop into one of the finest sports the world has yet beheld. It may be worth while to consider, therefore, whether the manner in which races are conducted is not susceptible of some modification that would at least minimize the danger while preserving its useful features."—*Automotor Journal.*

"The rapid development of high speed motor vehicles has rendered automobile racing a serious business, not to be undertaken lightly, and if undertaken at all, only under the most stringent precautions."—*Automobile Club Journal.*

"There is no further need for races to test automobiles; each manufacturer may individually make his trials and experiment with his improvements without asking 500,000 persons to attend. Races, I believe, have now been definitely ended; the vehicles and the roads do not lend themselves to it any longer. Let us look for other possibilities and something more practical at the same time."—*La France Automobile.*

"It is quite evident that speed trials on roads at the rate of 140 kilometres per hour are no longer possible. * * * Even the formal announcement of the Government that all speed contests will hereafter be prohibited could not arrest the formidable development of automobilism. Today the cause has been well and definitely won and our manufacturers have something better to do than to build racing machines of 90 horse power capable of developing a speed of 150 kilometres per hour."—*La Locomotion Automobile.*

"Speed contests have long enough blinded automobilists because these contests are sensational. It is true they have proved useful in the development of automobile engineering, but to the masses this effect of races was of no consequence, and only the fascination of seeing established speed records surpassed was what counted with the public. The satisfaction of these passions could, however, be of no benefit to the industry. * * * At last the automobile sport will turn into channels where it can be of more use to automobilism than by speed contests."—*Automobil Welt.*

"The completion of the very powerful and yet entirely reliable motor is a technical problem of the highest importance. * * * To the modern automobile sport belongs, accidentally, the credit for the development of the light heat motor. * * * In some weeks the excitement of the masses will have subsided and it will then probably be possible to keep on organizing road races until they have fulfilled their technical object."—*Der Motorwagen.*

A motor cycle race, which was to have been a feature of the Exeter Cycling Club sports on Whit Monday was abandoned in view of the recent Bristol disaster.

Obituary.

Marcel Renault.

Marcel Renault, who died at Couhé Verac on May 27 from the injuries he received in the Paris-Madrid race, was among the most successful men in the automobile industry of France. He and his brother Louis were conducting a small textile establishment, when in 1896 they became interested in motor cycles and built a machine of this type at a repair shop they maintained for a steam yacht owned by them. A year later they built a voiturette, using a De Dion motor, a speed change gear of their own design and shaft and bevel gear transmission, which latter they were the first to use in France. In 1898 the present works in Billancourt were established, and the Renault Brothers car soon became known through its successes in races. In 1900 Louis Renault won in the voiturette class of the Paris-Toulouse race, and in 1901 he again won in the same class in the Paris Berlin race. The brothers scored an even greater success when in 1902 Marcel was the first to arrive in Vienna in the Paris-Vienna race.

The Renault designs were highly ingenious, but mostly rather complicated, and their success is attributed to rational proportioning of parts and scrupulously careful workmanship. Among the inventions of the brothers should be mentioned the arrangement of upright radiating tubes on both sides of the engine through which the cooling water circulates by thermo-siphon action.

Marcel Renault was thirty-one years of age at the time of his death. He was known as a man of very modest personality and was highly esteemed in French automobile trade circles. His name must be added to that of a number of other brilliant men—Levassor, Mayade, etc.—which the French industry has lost through senseless speed competitions. A subscription has been started to erect a monument to the unfortunate driver at the place where he met his fate.

Motor Vehicles for the Transport of Garden Produce.

The use of motor wagons for conveying produce from the home counties to Covent Garden Market has within the past few months considerably increased, and it is stated that most satisfactory results are being obtained. A member of a large firm engaged in the vegetable trade recently expressed an opinion to a representative of the *Pall Mall Gazette* that the use of mechanically propelled vehicles was productive of considerable saving. In his opinion, in the near future motor wagons will largely supersede the ordinary contractors' carts and the railway vans for the conveyance of agricultural produce from the home counties to Covent Garden.

The second annual Automobile Congress opened at Paris on Monday, June 15, and will continue in session until June 20.

The driver of car No. 85 in the Paris-Madrid race in returning over the route from Bordeaux to Paris found the wrecks of forty cars by the way, the value of which he estimates at $350,000.

A petition from 107 owners of electric broughams and landaulets has been sent to the House of Commons urging that such vehicles should be exempt from any provisions for numbering automobiles.

The Society for the Protection of Human Life on Highways, of Paris, has sent a telegram to King Edward asking him in the name of humanity, of progress and of reason to prohibit the Gordon Bennett Cup Race.

Lorraine Barrow, who was thrown from his car in the Paris-Madrid Race after running over a dog, succumbed on June 13 to the injuries he had received, at Libourne, France, where he had been lying since the accident.

Kaiser Wilhelm will shortly receive an 8 horse power automobile which he recently ordered in Deutz. The vehicle will have three seats for imperial occupants and two for attendants, and will be used exclusively on country roads.

A bill has been introduced in the French Chamber of Deputies by M. Gervais to authorize the organization of an international exhibition of "sciences and arts applied to the automobile and to sports in general," to be held in Paris in 1905.

When the French Government prohibited the continuation of the Paris-Madrid race it also forbade the racers to leave Bordeaux under their own power. In consequence some strange processions were to be seen at Bordeaux on May 30, mostly composed as follows: A consumptive jade harnessed to a cab, in the cab a police officer in charge of the auto, and behind the cab, attached with a piece of rope, a racing machine of 80 to 100 horse power.

Some further modifications in the rules of the Gordon Bennett Race have been made. It has been decided to start the cars at seven minutes' intervals, instead of two minutes; arrangements have been made to draft another large body of police to help keep the course; extra controls have been arranged for at dangerous corners and narrow places along the course; no spectator will be allowed within a hundred yards of the course except where banks or stone walls exist.

One of the causes of accident in the Paris-Madrid race is said to have been that drivers tried to prevent others from overtaking them, contrary to the rules. In connection with Marcel Renault's accident it is stated that Renault had been indisposed for some days previous to the race and had asked the race committee to allow another driver to be substituted. This was refused, in accordance with the rules, and Renault, not to lessen the chances of his firm in the struggle, drove the machine himself.

The German Motor Cyclists' Association was organized at a meeting at Stuttgart on May 24, and Herr Emil Schmolz elected president.

Experiments in tarring roads are at present being made in the Bois de Vincennes, the public park to the east of Paris, where in 1900 the exhibit of automobiles was installed.

A number of members of the A. C. G. B. I. made a run from London to Hertford on May 28, and at the latter place gave some steering and brake demonstrations before the town officials.

The city administration of Leipsic, Germany, has prohibited the running of automobiles in certain streets, and a protest has been made by the management of the annual Leipsic automobile show.

The Moto Club de Nice, the formation of which we announced recently, has already about sixty members and is about to arrange a number of excursions in which speed above 12½ miles per hour will be prohibited.

A sign of the times: The speed contests comprised in the week of automobile events at Aix-les-Bains, France, will be replaced by a "superb touring competition, in which prizes to the amount of 15,000 francs will be awarded."

The Tsar has given his consent that Prince Michael Alexandrovitch, the heir apparent, shall become patron of the Russian Automobile Club. This is the premier St. Petersburg Club, which includes among its founders many persons of high distinction.

The Swiss Automobile Club, which held its annual meeting in Geneva on May 17, has at present 449 members owning 550 machines. The club decided to maintain a permanent office at the Hotel Metropole, Geneva. The next annual meeting will be held in Zurich.

A. A. A. Note.

The association is sending out large numbers of its individual membership application blanks, in conformity with its recently formulated changes in plan of organization. Anyone connected with or interested in the automobile industry may now become a member of the association upon payment of $1 initiation fee and $1 for annual dues. Local clubs are admitted for $10 without regard to number of members.

Club Notes.

ROCHESTER A. C.

The first automobile run of the club for 1903 was held on June 10 to Summerville. There are about 250 automobiles owned in Rochester and it was expected that fully one-half of them would participate in the run.

A. C. OF MAINE.

The Automobile Club of Maine elected about twenty new members at its last meeting, June 3. It was voted to participate in the hill climbing contest on the Fourth of July, but if the city government decides to have a parade the club will help to make it a success. The committee for the purpose consist of Maynard D. Hanson, Albert M. Spear, Jr., and Curtis H. Simonds. After the parade it is the intention to make a general club run to some nearby point where a shore dinner will be had.

MASSACHUSETTS A. C.

The Massachusetts Automobile Club, of Boston, took a run to Providence on June 13. The members present voted on the question of touring to Chicago to attend the American Derby.

The board of stewards of the race meet of the Massachusetts Automobile Club of Boston, has sustained the protest of Loren H. Robbins that the car driven by H. V. Chamberlain, and which won the race for gasoline cars under 1,000 pounds at the recent race meet, was over weight. The first prize goes to Mr. Robbins, the second to Mr. Jameson and the third to A. R. Bangs.

Denver A. C.'s Endurance Contest.

In the 100 mile endurance contest from Denver to Palmer Lake and back, held by the Denver Automobile Club on Decoration Day, eighteen vehicles started, and all but three finished inside the maximum time limit. The weather was fine and the roads in good condition, but the natural difficulties of the route were considerable, comprising stretches of sand and some very hilly portions. The cars were started at two minute intervals, the starting beginning at 8 o'clock. The outward run was in general very successful, all the cars, with the exception of a gasmobile, which had some trouble with its change gear, arriving at the outward control within a period of less than an hour. On the return trip one of the Rambler cars met with an accident of some seriousness. It struck a sandy portion of the road at a considerable speed, skidded and turned over, the two occupants being thrown out. Fortunately they were unhurt and the damage to the car, a buckled wheel, was repaired, and the return trip completed at a late hour.

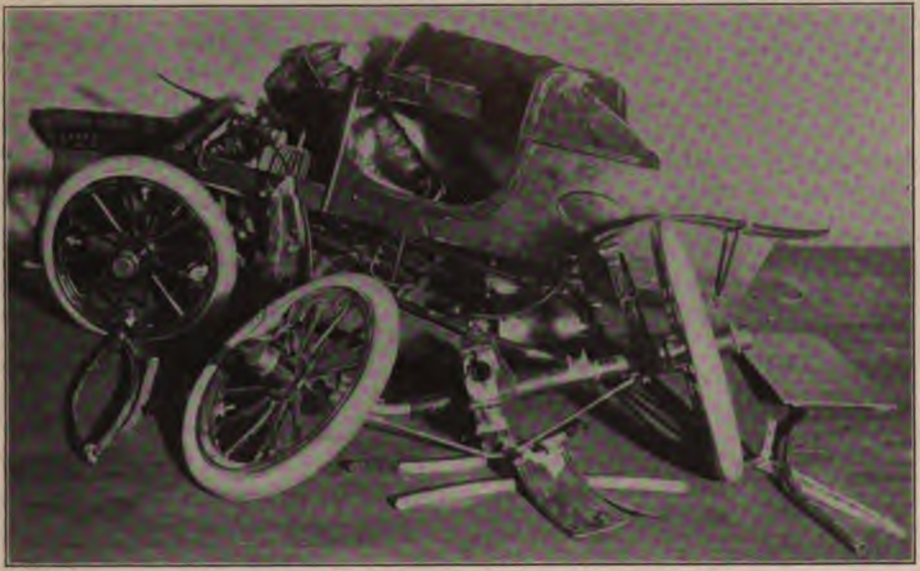
The fifteen vehicles first completing ac-

rived between quarter past 5 and 6 o'clock, one of the three Ramblers competing showing up first. There are a number of claimants to the first prize and a number of protests have been filed with the judges, owing to discrepancies in the times taken by the observers and the official timers.

Wrecked in Collision with Street Cars.

In an attempt to cross Madison avenue at the corner of 111th street, in front of two electric cars last Thursday, L. E. Reed and a companion narrowly escaped death, while the automobile in which they were riding was fairly ground to junk beneath them.

Mr. Reed, who was operating the machine, declares that he slowed down at the crossing and then started on again, thinking the motormen were about to stop. The cars continued, however, at full speed, and in an effort to avoid running in front of the car on the farther track, he was forced into the narrow space between the two cars. A bad wreck resulted, wheels and mud guards being torn off, tires ripped, the body splintered, and all frame members twisted or broken. No fire or explosion occurred.



L. E. Reed's Car After the Accident.

Mr. Reed was thrown in front of and partly beneath the automobile, but miraculously escaped with no more serious injury than a badly bruised arm. The other occupant of the vehicle caught a stanchion of one of the cars and swung himself into safety, receiving only a few bruises.

The wrecked machine, which we illustrate in this issue, was a Model D Crestmobile.

It is understood that an action for damages will be brought against the railway company.

A large Pan-American touring car has been placed in public service between the Waldorf-Astoria Hotel and the Woodmansten Inn, in West Chester, near the Morris Park race course. Regular daily runs are made.

MINOR MENTION

F. E. Schoonmaker, Adrian, Mich., is designing a four cylinder gasoline machine.

Hiram Percy Maxim has re-entered the employ of the Electric Vehicle Company, of Hartford, Conn.

F. A. La Roche & Co., New York, have taken the agency for the transmission gear manufactured by R. W. Coffee & Sons, Richmond, Va.

The Church Manufacturing Company, Adrian, Mich., make strong claims for a new transmission gear which they have adopted on their new cars.

In our description of the Empire Engineering Company's steam delivery wagon last week the fuel tank was referred to as a gasoline tank. As kerosene is used as fuel on this vehicle, the term "kerosene tank" should have been used.

The Seidler-Miner Electric Company, Detroit, Mich., are bringing out a new plug and spark intensifier combined.

The recent depression in the stock market is the reason given for the falling off in the trade in high powered foreign touring cars at New York.

C. A. Duerr & Co., 152 West Thirty-eighth street, New York, have taken the agency for New York and vicinity for the Reber and Ford gasoline cars.

It is reported that the Marr Auto Car Company will erect a factory in Detroit, and that the Ford Automobile Company will build a factory at Pontiac for the manufacture of touring cars and delivery wagons.

Banker Brothers Company gave a luncheon to about thirty members of the press at the Criterion Hotel, New York, on June 9. Among those present were L. P. Mooers, C. G. Ridgway, L. H. Kittredge and Samuel M. Butler, secretary of the A. C. A.

J. C. Brandes, New York, has removed to 10 West Thirty-third street.

A. J. Ostland, of Moline, Ill., is building an automobile from his own design. It is a light runabout.

L. P. Mooers, one of the American team in the Gordon Bennett Cup race, sailed on the Teutonic on June 10.

William E. Metzger, of Detroit, Mich., sailed for London, England, recently in the interest of the Cadillac automobile.

Charles Whiffler, 12 Sherman street, Detroit, Mich., is forming a stock company to build a gasoline machine of his design.

The Herman-Vaughn Automobile Manufacturing Company, of Indianapolis, Ind., has increased its capital stock from $12,000 to $50,000.

The Berwick Auto Car Company, of Hastings, Mich., has completed its organization and purchased the Hastings Iron Works plant.

Dr. David I. Bastian, of Clinton, Mass., died on June 7 from injuries sustained at Lancaster by his automobile running into a ditch and overturning.

The new foundry of the Olds Motor works at Lansing, Mich., has been completed and ground has been broken for a new machine shop, 500 feet long.

An automobile club has been organized in Mexico City for the purpose of furthering automobile sports. Minister of Finance Jose Ives Iimantour is the honorary president.

Automobile bodies, both with front individual seat and rear tonneaus made of veneer or built up wood, are being manufactured by the American Veneer Company, Jersey City, N. J.

The water supply department of Brooklyn has under consideration the purchase of one or more automobiles for the use of the engineer in charge of the Ridgewood and other pumping stations. Deputy Commissioner Van Iderstine is authority for the statement that bids will soon be advertised for the furnishing of a runabout, or similar light machine.

Hayden Eames, formerly connected with the Westinghouse Electric and Manufacturing Company, has taken the sales agency for the Westinghouse electric vehicle motors, Federal Manufacturing Company's pressed steel frames and parts (with the exception of chains and balls), and the axles and springs made by the Cleveland Axle Company and the Cleveland-Canton Spring Company, of Canton, Ohio. He will make his headquarters at Cleveland in the American Trust Building.

The Lewis Auto Company, of which it is understood Lewis M. Bloomingdale is the head, is fitting up the premises at 221 East Fifty-ninth street, New York city, for an automobile salesroom and storage station. The manager, Mr. Jacobson, states that the present quarters will be occupied only temporarily, after which a larger building in an equally suitable locality will

und. Only machines of foreign make o be handled, and we are told that Bloomingdale is now abroad effecting :y arrangements.

e A. L. Dyke Automobile Supply ›any, of St. Louis, Mo., has removed ·ger quarters at 2108 Olive street.

e N. A. A. M. has just sent out a cir- to members asking whether they d participate in a commercial vehicle ·st to be organized by the association fall.

ie Acme Motor Car Company have suc- ·d the Reber Manufacturing Company, eading, Pa., and have applied for in- ›ration with a capital stock of $200,000. officers are George D. Horst, president, James C. Reber, treasurer and general ·ger.

new automobile storage and repair , 200x28 feet, is to be built at Scioto Vermont streets, Indianapolis, Ind., by w company recently incorporated. S. Elston, the Waverley agent, is inter- . John B. Cockrum is president of :ompany.

nker Brothers Company, of Philadel- report the following sales for the . ending June 13: Autocars, to Alex- r Allen and Miss Bobberd, of Chestnut Pa.; George F. Tilton, of Uniontown, W. A. Flinn, of Cape May, N. J.; W. Keightley, of Vineland, N. J., and an nt to Valentine L. Franz, of Philadel-

ty C. Van Alstyne, of New York, ac- ›anied by Henry M. Crowther, of Salt : City, while trying to make the longest mobile trip on record in the West, be- : stranded 230 miles out on the Great rican Desert. The two men walked 73 s across the burning sands and caught eight train, Mr. Van Alstyne nearly g of thirst.

embers of automobile and driving clubs ested in building and maintaining good s in Onondaga County, New York, : invited by the committee on good s of the county board of supervisors ieet in the Common Council chamber yracuse on June 13 for the purpose of ing an organization to promote interest ie subject.

ie Pressed Steel Car Company, of sburg, has entered upon the manufac- of pressed steel automobile frames, it is reported, have already contracted a number of prominent automobile ufacturers for the use of their product. hope to be in a position to announce technical details of their frame con- ction in an early issue.

ie Black Diamond Automobile Com- , of Geneva, N. Y., is preparing its machine for exhibition in New York. will be equipped with a Dieter steam ocarbon motor and geared to run 60 s an hour. The company's factory will begun on August 15 and will be 150x feet, with two stories in front for of- room and one story in the rear.

LEGISLATIVE AND LEGAL.

A Legal Decision on the Bailey Law.

In the case of Gustave Lippman, who was arrested on May 17 on the charge of having driven his automobile 15 miles an hour in 189th street, New York, and who was tried in the Court of Special Sessions on June 10, a decision of more than usual interest to automobilists was given. The officer who made the arrest had measured off 264 feet on Webster avenue, and timed Lippman over the distance in twelve seconds. Then he arrested him on a charge of violating Chapter 266 of the laws of 1902, which makes it a misdemeanor to run an automobile faster than 8 miles an hour in a town, except where a city ordinance permits a greater rate. When asked whether the houses in the neighborhood were less than 100 feet apart, the officer could only say that "some of them were," and a motion to dismiss the complaint was granted. In so doing the court pointed out that the old law was limited by the more recent Chapter 625 of the laws of 1903, the Bailey law, which says that no ordinance may be passed forcing automobiles to run slower than 15 miles where the buildings are more than 100 feet apart, and it was held that as it had not been shown that the automobile had passed a school house during a session, or a church while services were in progress, or anyone riding or driving a horse, that the defendant did not violate the Bailey law by going at a rate of 15 miles an hour. If any law at all was violated, it was, in the opinion of the court, the highway law, which was amended by the Bailey law.

Missouri State Automobile Law.

SECTION 1—REQUIRED TO STOP BEFORE PASSING HORSE VEHICLE.

Every person, corporation, company or copartnership engaged in operating any automobile by steam, gasoline or electricity or other motive power upon any of the public streets, roads or highways of this State, shall keep a vigilant watch for vehicles, carriages or wagons drawn by animals, and especially vehicles, carriages or wagons driven by women or children, and shall when approaching any such vehicle, carriage or wagon so drawn by animal or animals stop such automobile for such a time as to enable such person in charge of any such vehicle, carriage or wagon to pass, or if going in the same direction, shall before attempting to pass give said drivers or person in charge of any such vehicle, carriage or wagon drawn by animal or animals sufficient notice of his or their intention to pass, by the sounding of a bell orwhistle, and if necessary to prevent the frightening of such animal or animals bring said automobile to a stop in order to give such driver or person an opportunity to alight from such vehicle, carriage or wagon.

SECTION 2—SPEED REGULATIONS.

All persons, corporation, company or copartnership engaged in operating any automobile as aforesaid, shall when required by the driver or person in charge of any vehicle, carriage or wagon drawn by any animal or animals, give the right of way to such driver of such vehicle, carriage or wagon and shall not run such automobile at a greater rate of speed than 9 miles per hour.

SECTION 3—NUMBERING.

All automobiles operated or run upon any of the public streets, roads or highways of any city or county in this State shall bear a number corresponding to the number of the license, placed at a conspicuous place; and if run or operated in the night, shall have two lighted lamps on the front part of said automobile, and on said lamps shall be painted in legible figures, at least 3 inches long, the number thereof.

SECTION 4—LICENSES.

Every person, corporation, company or copartnership desiring to operate any automobile propelled by steam, gasoline or electricity or any other motive power shall obtain a license from the license commissioner, or if desired to operate same in any county outside the incorporate limits of any such city or any of the public highways, streets or roads of this State, shall obtain a license from the county clerk of such county authorizing the operating of such automobile, and shall pay to the license commissioner, if in a city having such commissioner, or if in any county to the county clerk of such county, the sum of $2 per annum for each automobile so operated and run on the streets, roads and highways, which said sum shall be paid into and become a part of the general road fund.

SECTION 5—PENALTIES.

Any person, corporation, company or copartnership violating any of the provisions of this act shall upon conviction be adjudged guilty of a misdemeanor and punished by a fine of not less than $100 nor more than $1,000, or by imprisonment in the county jail not less than thirty days nor more than six months, or by both such fine and imprisonment.

New York State Register.

From the office of the New York Secretary of State at Albany it is reported that 4,400 names of automobile users have already been registered in compliance with the provisions of the Bailey law. As new names are coming in at a rate of over 150 a day, it is probable that the foregoing number will be largely increased before registration falls to a normal rate.

French Auto Editor in Conflict with Bailey Law.

Julien Teza, an editor of *L'Auto*, the Parisian daily sportsman's publication and official organ of the Automobile Club of France, had the misfortune on Saturday last to be arrested for violation of the Bailey law. M. Teza arrived in New York a few days ago to study the automobile situation in the United States. On Saturday afternoon he took an automobile ride on Riverside Drive and soon was going at a lively pace, something after the manner in which Parisian automobilists are wont to sail up the Champs Elysées. A bicycle policeman caught sight of M. Teza and arrested him for speeding, taking him to the West Side Police Court. There Teza was detained all night and on Sunday morning he appeared before Judge Zeller on a charge of having driven his machine at the rate of 20 miles an hour. The judge placed the prisoner under $100 bail until Monday morning.

Mayor Bonachea, of Havana, Cuba, has issued an order whereby the speed of automobiles is regulated for certain streets.

The Ontario Legislature has fixed the speed of automobiles in cities, towns and incorporated villages at 10 miles an hour.

A. C. Banker, of Chicago, Ill., on June 9 secured a temporary injunction restraining the city from interfering with automobilists who have not taken out a license.

At the suggestion of the corporation attorney of St. Paul, Minn., the Assembly has postponed indefinitely an ordinance regulating automobiles, as it was feared a city ordinance would conflict with the State law.

An ordinance has been introduced before the mayor and board of aldermen of Birmingham, Ala., fixing the maximum speed of automobiles at 8 miles an hour, and requiring that signals be sounded upon approaching crossings, etc.

The hearing at Mineola, N. Y., of Charles Bartell, chauffeur for August Belmont, has been postponed for the purpose of securing the presence of an expert to prove that the machine which the chauffeur was running when arrested cannot make the speed at which it is alleged to have been going.

Three special policemen of Minneapolis and St. Paul have been detailed to watch a man who takes particular delight in stringing heavy wires across Summit avenue. Several drivers of automobiles dodged or ran into the wires and only the greatest care has prevented several bad smashups.

In the case of Herman Unger against the town of Fanwood, N. J., for a review on a writ of certiorari of the automobile ordinance, for violation of which Unger was arrested, the court held that the proceeding is an attack upon the ordinance exclusively and not against the proceedings which encompassed the arrest, that the borough was within its granted power in passing the ordinance, and dismissed the writ.

Milton J. Budlong, president of the National Association of Automobile Manufacturers and president of the Electric Vehicle Company, was fined $121.23 at Manchester, Conn., on June 8 on the charge of having run his automobile faster than the legal limit of 15 miles an hour. An appeal was taken.

After three days' trial with the heavy automobile 'bus between Lynn and Nahant, Mass., the selectmen have refused to grant the license necessary for the line to be run regularly and it will be discontinued. The principal objection found is that it frightens horses and renders driving a very dangerous pastime.

The automobile regulations of the District of Columbia became effective on June 7, but thirty days in which owners may take out permits to register their machines are allowed. Separate application blanks are prepared for the registry of machines and for a permit. Each machine must have a separate number, but the number of the permit need not be the same as that of the machine. In this way dealers may register all their automobiles and have numbers assigned to them. In the case of applications for steam automobile licenses the same examination as has been prescribed since that type of automobile was introduced into the city will be followed. For gasoline and electrical machines the examination will be purely mental, it is believed, in order to satisfy the examiners as to the knowledge of the operators on the care of the machines and the fuel used. The board of examiners has organized by electing E. F. Vermillion as chairman and W. A. McFarland as secretary. The other members of the board are W. C. Allen, electrical engineer of the District; C. E. Foster, vice president of the National Capital Automobile Club, and Henry Boesch and Daniel Johnson, of the board of steam examiners.

New Steel Roadway Scheme for Long Island.

The long talked of automobile speedway on Long Island may soon become a reality if plans that have just been submitted to the National Association of Automobile Manufacturers and the American Automobile Association by General Roy Stone are carried out.

The new scheme provides for a roadway 40 feet wide, laid with a double track of flat steel rails, similar to the experimental tracks recently placed in Murray street, New York city. Hedges and wire netting will border the right of way, and grass will be planted between the rails to keep down dust. No grade crossings with other roads will be permitted. When completed, the course would be 112 miles long, extending from Long Island City to Montauk Point, and passing through Flushing, Creedmore, Floral Park, Hempstead, Good Ground, and other suburban points. The cost of construction is estimated at $15,000 a mile, and it is said that a number of prominent millionaires are actively interesting themselves in the project. William C. Whitney is reported as willing to contribute $100,000.

Liquid Fuel.

The end of the eighteenth century was a period which has left its mark on the scientific world, as being perhaps the time during which more work was done—more discoveries made—than any other period before or since. At that period we had working and laboring in England men like Priestley and Cavendish, while in Edinburgh was a young doctor named Black, who, by introducing the chemical balance into scientific work, did an enormous amount of good, and entirely turned the whole bent of the research of the day. In Sweden at the same time lived and labored an apothecary named Scheele, who, with only limited means at his disposal, discovered many very important facts; and while these men worked, labored and discovered, there was in France that master mind, Lavoisier, who in his all too short career did an enormous amount for science, and, among other things, gave us the true theory of combustion, the true idea of what combustion really was. Up to that period men's minds had been imbued with an old theory known as the Phlogistic theory, which was started at the end of the seventeenth century, and which so warped the knowledge of the day that practically no scientific progress was possible. This theory of combustion seems absolutely absurd to us with our twentieth century knowledge, and it was in two or three words roughly this: If a piece of coal and a piece of stone be taken, it is found that the coal burns and the stone does not. In the coal, according to this theory, there is the ash that is left behind in the grate when it is burnt, there are the gases which escape up the chimney. These are all packed away in the coal, and with them a something, a spirit called Phlogiston, and when the coal is ignited that spirit escapes and gives the phenomenon of burning. It is hardly conceivable that that was an accepted theory, and yet for over a hundred years it held its own.

When Lavoisier first commenced the work of his life, one of the earliest experiments that he made seemed to show that when substances were burned there was an increase in weight. If you take a piece of magnesium wire and burn it in the air, a white ash is produced. At the same time you get a brilliant emanation of light, and if you were to weigh the magnesium before the experiment and afterward, you would find a distinct increase in weight: the ash weighs very much more than the magnesium originally taken. He then made a large number of experiments, researches which showed that this was a common property with all substances—that if you burnt a candle, suspended on a balance, under such conditions that all the

products that escaped from it as it grew smaller and smaller and finally disappeared, could be collected, and you would have the end of the balance to which it was attached, and to which the apparatus was also attached for collecting the products as they escaped, growing heavier and heavier, and showing an enormous increase in weight by the time combustion was finished. When Lavoisier had clearly established this fact, he then attacked the Phlogistic theory; because, as he pointed out, it required that the products of combustion should be lighter, whereas they proved to be heavier than the substance burnt.

One can easily imagine that in those early days a theory which had stood the test of a hundred years was not going to be broken down by any man's work in a few weeks or months, and the moment Lavoisier made his attack on the Phlogistic theory the Phlogistonites were up in arms, and came forward to its defense. They said: "You tell us that when a substance burns the products formed are heavier. Of course they are. What did you expect? Phlogiston is something which weighs less than nothing, and so, when this escapes, it leaves products behind that are heavier." Lavoisier's facts were too strong, however, for such arguments, and very soon broke down that old theory. But he did what very few men would have done. The destructive power in man is one which is brought to a very high pitch of perfection, and it is easy after all to attack and very often discredit other men's theories; but it is very difficult to construct a new one in its place, and Lavoisier did both. Not only did he break down the old theory, but he gave us our present theory of combustion, which we now recognize, as far as we know anything to be true, to be the true one.

LAVOISIER'S EXPERIMENTS.

A long series of experiments was entered upon by Lavoisier, by which he discovered that whenever you had a substance burning, the air played an important part in that combustion, and that without air no combustion could proceed. Taking simple forms of combustible matters, he showed that if carbon in any of its forms be burnt the carbon disappears, together with a certain amount of oxygen from the atmosphere, and that these two substances that have gone have been welded by chemical action into a new compound—into that gas which we call carbonic acid gas, or, more correctly, carbon dioxide. It is in that rushing together to form this new compound that energy has been developed in the form of heat, which, if the combination is rapid enough to give high intensity, makes itself manifest in the form of incandescence and the other phenomena of combustion.

Before Lavoisier ended his life under the guillotine of Robespierre he had succeeded in getting his theory of combustion thoroughly accepted, and it is the theory of combustion which we accept to the present day. Whenever a substance burns, the heat which is developed is the energy produced by the chemical action which is going on. From that period two terms have survived, and are in use even at the present day, and these are "combustible" and "supporter of combustion." Those substances which when burnt in air combined with the oxygen with sufficient rapidity were termed "combustibles"; while those substances which, like the oxygen of the air, supported all combustion were called "supporters of combustion." Oxygen at that time was looked upon as the only supporter of combustion; but at the present time we realize that these terms are purely relative. It is found that under the conditions existing in our atmosphere, where oxygen is present in the air around us, we can burn a jet of coal gas or paraffin oil. The carbon and hydrogen of the paraffin or coal gas unite with the oxygen of the air; but in a large volume of coal gas it is just as easy to burn a jet of air as it is to burn a jet of coal gas in the air, and whether you have a flame of coal gas in air or of air in coal gas, the chemical action that is going on is exactly the same, and we see that those terms "combustible" and "supporter of combustion" must be looked upon merely as relative.

Very soon after that period the name of fuel was gradually applied to those substances which were of sufficiently wide distribution to be everywhere applicable to the generation of heat, both for domestic and manufacturing purposes, their number being limited by the wideness of the distribution and the ease of obtaining them, and up to the present time practically all our fuels are of purely vegetable origin. When one speaks of fuels, one may look upon such substances as paper, wood, coal and its derivative, coke, or the derivative of wood, charcoal, as being fuel, simply because they are available everywhere that civilization has spread for the generation of the heat which is needed to carry on the various processes of manufacture and to supply comfort to life; and you find that they have all one common origin, and that is vegetation.

ORIGIN OF FUEL.

The plant, urged on by the energy derived from the sun, sucks in from the air carbon dioxide, which is being evolved by every man or animal that breathes, and by every particle of fuel that burns, and which in time would hamper the atmosphere and render it absolutely unfit for life, if it were not for the fact that vegetation uses it as a food. As the plant grows it sucks in this carbon dioxide from the atmosphere through small pores in its surface, and it also takes in moisture from the air, and soil, and then, urged on by the energy of the sun's rays, you have that marvelous chain of chemical actions commencing which lead to the gradual conversion of the water vapor and carbon dioxide into the solid matter of the wood.

All wood, be it simply the fibre that is found in a small growing herb or the timber that is obtained from a big oak tree, has as its basis a compound called cellulose, which is formed by the carbon of the carbon dioxide being gradually welded into cellulose with the hydrogen and oxygen of the water. While this action is proceeding, the oxygen that was originally grouped with the carbon as carbon dioxide goes back into the atmosphere and purifies it, keeping it in a fit condition both for combustion and for life. In this way vegetation not only keeps the atmosphere in a condition of purity, but also builds up, from deleterious emanations, the solid matters which give the various forms of timber, only differing in the density with which that cellulose is packed away, and in the various constituents that are found in the sap, and also, of course, in the amount of moisture which is present in it.

Wood, which may be looked upon as the first form of fuel, is a substance which is certainly the poorest of the fuels that we have. In the first place, in an average sample of wood it is found that there is never more than 80 per cent. of real fuel. There is always about 20 per cent. of moisture, and some woods contain far more. The driest wood known contains 20 per cent. of moisture, oak containing about 30 per cent., and the poplar as much as 45 to 50 per cent.; and with air dried wood 20 per cent. of moisture will still be found, so that even in the beams out of an old farm kitchen, on which flitches of bacon have been curing for 200 or 300 years, you will still find between 16 and 20 per cent., although it has been air dried under conditions which should drive out all moisture from it. Again, if a piece of wood be artificially dried until there is practically little or no moisture in it, it will be found that on exposing it to the air for any length of time it gradually sucks in moisture again until it gets very nearly back to that percentage. Wood is hygroscopic to a very large extent, and that is one reason why it is an exceedingly bad fuel.

If vegetation with its basis of cellulose be allowed to decay freely exposed to the atmosphere, the processes of decomposition gradually convert it back into the substances from which it was formed, carbon dioxide and water, and that is what takes place in the rotting away of wood. But when decay is checked, and the vegetation after it has died is protected from the action of the atmosphere, a process known as checked decay will take place, and in that process some of the constituents of the cellulose begin to act upon each other. In marshy ground, and in places where the watershed has not had sufficient fall to carry off the rain, swamps are formed, which give rise to large quantities of rank vegetation during the summer months. This grows up rapidly, and perhaps two or three crops of it rot down in the course of a year. As the winter comes on the flood brings down mud and silt, which

cover it, so that by the time four or five years have elapsed this vegetation, which has been kept from the free action of the r, has undergone a process of checked :cay, which has converted it into the substance called peat. The action which has been going on has been the elimination of a certain proportion of the oxygen and hydrogen of the original cellulose, and peat is the result, which in certain countries, like our sister isle, plays such an important part in the list of available fuels.

Peat is of interest, not because it is a good fuel, but because it is not; it is only about the same value as a fuel as wood in its best condition; but it is an intermediate step in that wonderful series of changes which give us our premier fuel, coal. In days long before men inhabited the world—in days, too, when the atmosphere was not the atmosphere of today, but consisted practically of nitrogen and carbon dioxide, the residuum of that great conflagration, the great heating iron which formed the earth, an immense vegetation grew in a way that vegetation has never grown since, and with an atmosphere highly charged with carbon dioxide and water vapor, with the crust of the hardening globe extremely thin, and the heat from the molten portion then making itself perfectly manifest on the surface, heated from below and fed and nourished from above, vegetation grew with tremendous rapidity; and our coal seams show that plants of the same family as the marshy vegetation of today, which only grows to a of 4 or 5 inches, then grew to a of 60 to 70 feet, and probably rotting down as rapidly as does the vegetation of today, became a mass of vegetable matter undergoing decay. Then occurred sudden changes in the earth's level, eruptions of a volcanic character, which fortunately are rare today but were common events in those times, and were fairly general all over the world; together with sinkages and upheavals taking place in every direction. And a sudden sinkage where a quantity of this vegetation was rotting would cause an inrush of enormous quantities of water carrying silt and soil; and gradually, after hundreds of years, these deposits dried, hardened and perhaps even crystallized, forming the strata that are found today above the coal measures.

FORMATION OF COAL.

Pressed upon from above with this weight of superincumbent soil, heated from below by the still cooling earth, the vegetation was converted into peat, and afterward into coal; and according to the degree of action and the way in which it took place it formed either lignites or cannels, in which there was still a large quantity of hydrogen and some oxygen left; or bituminous coals, in which the quantity of hydrogen was lower and the oxygen lower in a still higher ratio; or anthracites, in which nearly the whole of the hydrogen and oxygen were got rid of; while the last *stage* of all in that wonderful action was the formation of graphite, or blacklead, absolutely pure carbon, from which the whole of the hydrogen and oxygen had been carried off by the changes which were going on. All these substances are purely of vegetable origin, and have been until quite recently our staple fuels.

Within the last twenty or thirty years liquid fuel has begun to show its right to take a place among these other autocrats of the fireplace, and its use really started about the middle of the last century. When and where liquid fuel was first used is a matter of uncertainty. Herodotus gives an account of the finding of oil in many of the districts near the Russian oil fields, and in the Bible one finds various references to it; but the traces then were only excessively small. It was known, however; and it was also known that it would burn with a flame which gave a considerable heat. And although the oil districts of America and Russia were practically known for very long periods and their presence marked—the Russian ones by the presence of the fire worshippers of the East and the American by the presence of the Indians, who collected the oil from the wells and ponds for healing and other purposes—yet it was not until the middle of last century that the oil industry and oil as a fuel may be said to have originated.

INTRODUCTION OF MINERAL OIL.

The first step in the introduction of mineral oil dates back to 1849, when James Young had his attention drawn to the small driblets of oil that ran down from the shale measures in the Riddings Collieries, near Alfreton. Taking this oil and distilling it, he made from it an excellent lubricant; but no sooner had he got a good client for his lubricant than he found that the supply was totally insufficient, and showed signs of being exhausted; but on distillation some of the Scotch shales gave him an abundant supply of the oil, and so started the Scotch oil industry. Later on, in 1859, the oil fever broke out in America. In Pennsylvania the oil, which had been collected for centuries in small quantities, was suddenly obtained in enormous volumes by Drake, who started the idea of boring wells, which gave him an abundant and enormous supply. Financial booms took place in America, which led to the sinking of innumerable wells over that district, and the flooding of America and the civilized world with oil. By 1870 also the Russian oil fields were opened up, yielding an amount of oil which very soon made them an important competitor of the American trade.

Even before that time, in 1865, Captain Selwyn, of the Royal Navy, first of all brought a paper before the United Service Institution in which he strongly advocated the use of petroleum as a fuel on board ship, pointing out the manifest advantages which it had. However, at that time he was very strongly and warmly opposed by Dr. Paul and others, who pointed out that petroleum was a substance which would require the most careful handling; and inasmuch as the properties of petroleum were but little known at that time, Selwyn's arguments in its favor were but very little listened to. Nevertheless he went on with the subject, and in the very next year, 1866, read another paper before the Institute of Naval Architects. By that time he had abandoned the idea of petroleum, and in looking about for some other liquid fuel to burn, hit upon the oil which is known as heavy tar oil. After tar is sent from the gas works to the tar distiller there are first of all distilled from it the benzine and light oils, such as naphtha. Then the heavier oils distill over containing creosote.

OIL AS A FUEL.

It was with these oils that a very large number of experiments upon a couple of Lancashire boilers were made, and some most extraordinary results obtained. They were extraordinary results then, and they are more so now. There was some mistaken factor in his figures which I do not think has ever been cleared up, and a great deal of attention was in that way turned to the subject of liquid fuel. Selwyn was led to make some experiments down at Woolwich, where he fitted up a small launch, and again got very good results, which, in the light of modern practice, one now knows were practically correct. These experiments gave rise to the idea of liquid fuel, and by this time the Russian oil trade had made great strides forward. There on the spot it was distilled, first of all to give the light spirits, then the burning oils, while left behind as a residuum was the mixture of heavy oils known as astatki. This residuum was a great nuisance to the Russian distillers at that time. They had no outlet for it, and would often run it on to waste ground and burn it, simply to get rid of it, with the result that the atmosphere was polluted for miles round with the clouds of smoke from the burning oil, and an enormous amount of good material was wasted. However, soon after they began to make experiments at burning it, and Nobel in introducing his trough forms of furnaces showed at once that it was of enormous utility for stationary boiler works and also in locomotives, and by 1870 a very large number of small vessels on the Caspian were fed by liquid fuel, practically nearly all of them, while later on the use of liquid fuel spread to the Black Sea.

At that period the supplies of petroleum were practically confined to these Russian and American fields, and a sufficiently reliable supply of the oil could not be obtained, which would be of the right quality, sufficiently widely distributed over the world to allow it to take its place as a fuel. That was the trouble that Selwyn found in his attempt to introduce it. Wherever it could be obtained, as on the Black Sea, the Caspian or in America, it wa[illegible] d a fuel as could possibly be [illegible] much as universal disti[illegible]

to obtain it in large supplies at a reasonable price were really the important factors in the fuel question, oil even then had not attained to that dignity.

Things are entirely changed now, owing to the discoveries of petroleum in almost all the countries of the world. A much wider distribution brings it nearer and nearer to a universal fuel, and moreover prices, owing to the large quantities of it available, are also likely to be kept down by competition; so that the time is now ripe for petroleum as a liquid fuel to take its proper place. And there is not the slightest doubt in the minds of those who have followed the trend of the last few years that liquid fuel will be the fuel of the next fifty or sixty years for the raising of steam power.

All forms of petroleum are composed of certain compounds which are known under the name of hydrocarbons—bodies which contain hydrogen and carbon in combination. These hydrocarbons, however, vary a good deal in composition according to the part of the world from which they are obtained. If the petroleum is from the American fields—that is to say, from the Pennsylvanian fields—it will be found that all the hydrocarbons which are at present in it are practically of the kind we call paraffin hydrocarbons—all of them members of that group of hydrocarbons of which marsh gas or methane is the simplest member—a group of hydrocarbons in which the proportion of carbon and hydrogen present varies according to the ratio $CnH_2n + _2$. They are saturated hydrocarbons—that is to say, the carbon particles in the molecule are combined with the largest proportion of hydrogen which they can hold. Marsh gas is CH_4, and contains one carbon atom combined with four of hydrogen, which corresponds to the ratio given above. Each member of the group gradually rises by an atom of carbon at a time, so that its next member is C_2H_6, and so on to C_4H_{10}, these bodies being gaseous. The next number of the group is pentane, which is a liquid so excessively volatile that unless it be kept in well corked up cans very little of it will be left in the can after an hour's exposure.

With pentane this series of hydrocarbons becomes liquid, and gradually, with increase in the number of carbon atoms, gets more and more viscid, with a higher and higher boiling point, until at about the fifteenth member of the group one arrives at substances which, though still liquid, are so viscid that the numbers from 15 to 20 give that jelly-like mass known under the name of vaseline. For another five members they are still viscid slightly, and about the twenty-fifth member of the group begins the real solid.

In the American oil fields natural gases are obtained, and methane, the simplest member of the group, is one of the chief constituents, and in the oil from these fields liquid members of the group are practically all of them represented.

When you come to the Russian fields, on the other hand, you find hydrocarbons of a different character, belonging to a curious class of bodies called naphthenes. These are isomeric, with bodies like ethylene, and really may be looked upon as belonging to that series which in its simplest form may be represented as belonging to the CnH_2n series. They are unsaturated hydrocarbons, and this manifest difference in the composition of these hydrocarbons, although it makes very little difference to the action in combustion, and when otherwise used as a fuel, makes a very large difference in their chemical properties, and the alterations that can be brought about in them by heat and other processes.

THEORIES OF ORIGIN.

There are several theories to account for the formation of petroleum. One class of theorists insists upon its vegetable origin, declaring that it is the result of distillations from such fossilized vegetation as coal. Another and perhaps larger class argue that it has been formed from animal remains, while a third party are perfectly clear in their views as to these hydrocarbons having been formed by the action of water or steam under considerable pressure upon metallic carbides. Carbides are substances formed by the combination of metals and carbon. There is one carbide perfectly well known—calcium carbide—and by the action of water it yields acetylene. In the same way as water and calcium carbide give acetylene, so water and some of the carbides of the rarer earths will give hydrocarbons of exactly the same composition as many of the hydrocarbons found in the mineral oils.

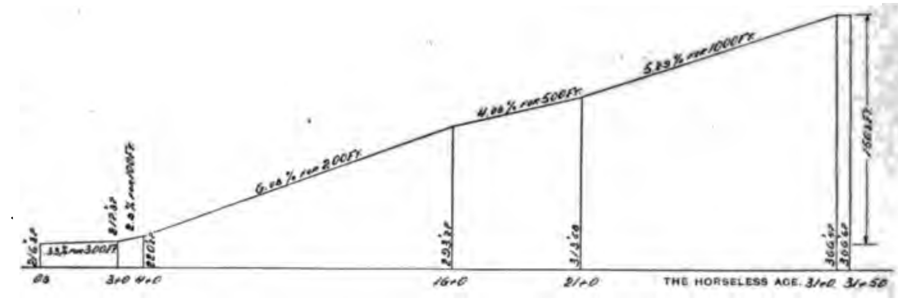
In each of these theories in all probability there is a certain amount of truth, for with American petroleum there are many indications of its being of vegetable origin. On the other hand, the animal origin of Russian petroleum seems equally probable. We need not waste time, however, in discussing this point, and we can now go on to the general value of oil for fuel purposes.

With land boilers the use of oil has great advantages, but for use on board ships the advantages are greater still. One of the worst jobs on board ship is coaling. All the coal has to be got into the bunkers, meaning an enormous amount of extremely hard labor; everything on the ship is made filthy by the coal dust necessitating cleaning and polishing up afterward. As regards the advantages of oil in this direction there can be no reasonable doubt. Taking the oil in from big storage tanks alongside the wharf, it can either be run into the portions of the ship which are reserved for storage by gravity, or it can be pumped in, and instead of having the coal bunkers, as one is obliged to for coal, above the level of the stokehold, the storage tanks for the paraffin, or whatever liquid fuel it may be, may be in practically the ballast tanks, and as the oil is used it can be replaced by water. That gives an enormous increase in capacity to the ship. In the first place, if it be a ship of the mercantile marine, it gives a large amount of cargo room, which means, of course, greater earning power for the ship; if it is a man-of-war, it does more. In the latter case, it gives the power of storing a much larger amount of energy in the same space as coal would have occupied.

Liquid fuel is far in advance of coal as a steam raising agent, as we shall see in a few moments. In point of fact, it is found that 1 ton of oil is about equal to 1.75 to 1.77 of coal, and the result is that for the same weight an amount of fuel can be carried which will give a very much greater radius of action, and that at the present time in the navy is of the very greatest possible importance. Again, in the feeding of the oil to the furnaces, instead of needing a very large number of stokers for trimming the coal in the bunkers and keeping up the fires, the use of oil will reduce that number. This is an economy, and in practice about one-fourth the number of stokers is required as when solid fuel is used. In these days, when the stoker is a very important factor in the shipping trade, that is a most important point also to consider. The economy which is gained by the use of liquid fuel in the labor question is one which certainly ought not to be left out of the question in discussing the relative price of the two fuels.

Moreover, in coal there is a large amount of mineral matter present, which remains behind in the form of ash, clinker and cinder, and these have to be cleared out of the fire and thrown overboard, which means an enormous amount of handling and labor, which is entirely absent in the case of the oil, which leaves no ash of this character behind. All these are points of the greatest importance as scoring in favor of liquid fuel. There have, however, been several factors which have retarded its introduction.

In the first place, unless the precautions which have to be taken are clearly grasped, there are many things which would act as a setback, and everyone knows that among people who have not been accustomed to the handling and use of oil there is a rabid fear of the danger of fire and explosion. That led to the flash point prescribed for liquid fuel being fixed at an unreasonably high figure. In the mercantile marine, Lloyd's Register have fixed 200° Fahr. as the flash point of any oil that has to be used as fuel on board ship; in the service 270° is the prescribed flash point. To obtain and use an oil with a flash point as high as this at once introduces very considerable difficulties. In the first place, the distillation of the oil has to be carried to such a point that the residuum of liquid fuel comes to a fairly high price; and the next place, where the oil is distilled to a point where it has a flash point of 270°, it is in such a thick, viscid condition that it is troublesome enough to have to



PROFILE OF HIGHLAND PARK HILL.

deal with it in the summer weather, to pump it and lead it to the injectors, while in winter that difficulty is very greatly increased. This is a point which I hope will in the near future be put right. There is not the slightest need for such a high flash point. In Germany they admit a flash point of 150° for service purposes, which is a safe point with properly constructed tanks for the oil, and yet there is an enormous number of practically waste residuums from distillation which will have a flash point well over that, and which will be cheap and safe, easy to handle to give all the requirements that are necessary. The lowering of the prescribed flash point is a necessity before liquid fuel becomes universal.

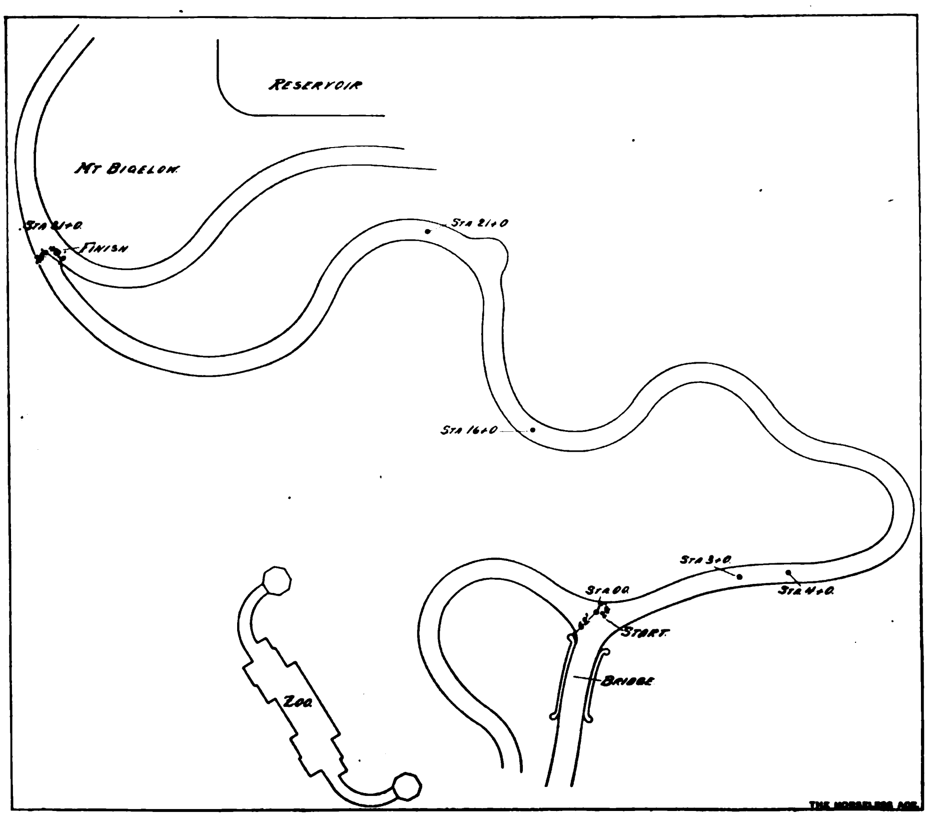
Pittsburg is noted for its hills, many of a mixture of many hydrocarbons, will have so low a flash point that its use as a fuel would be attended with danger on land, would certainly never be permissible and it is to such residues as are left the distillation of the more volatile ns and the lamp oil that we must look for the chief source of our liquid fuel.

PETROLEUM VS. COAL.

Petroleum being composed of carbon and hydrogen, and containing no mineral matter in solution to leave a residue on burning, must manifestly have a high calorific value, and a comparison of its value as a fuel against coal may be arrived at in three ways:

1. By calculation from analysis.
2. By determination in a calorimeter.
3. By direct comparison of the results obtained in working.

The beautiful work of Andrews, Favre and Silberman, and Thomson has given us the basis upon which all calorific calculations are founded. Burning a unit weight of pure carbon under conditions which insured the whole of the heat developed being transmitted to water, they found that 8,080 unit weights of water could be raised 1° C., and that under the same conditions a unit weight of hydrogen would raise 34,400 units of water 1° C., hence they ascribed the value of 8,080 thermal units to carbon and 34,400 to hydrogen. (From a lecture by Prof. Vivian B. Lewes, before the Petroleum Institute, London.)



ROUTE OF PITTSBURG HILL CLIMBING

Pittsburg Hill Climbing Contest.

The hill climbing contest of the Automobile Club of Pittsburg, which was to have taken place over the Serpentine Drive in Highland Park on June 13, was postponed until June 20 on account of continued rains. The course was in horrible condition, as it had been but recently covered with 3 inches of broken limestone. Up to the present time there are more than forty entries, embracing the following makes of machines:

Mercedes, Clement, Darracq, Decauville, Peugeot, Winton, Peerless, Autocar, Stevens-Duryea, Gasmobile, Franklin, Pierce, Orient (buckboard), Oldsmobile, Northern, White touring car, White stanhope, Stanley, Foster, Toledo, Waverley, Riker, Columbia, Studebaker.

The course is 2,200 feet long, of which the first 300 feet is practically level. Then the grade of over 6 per cent. begins at the beginning of a curve of 175 degrees, whose diameter is but 110 feet. No matter how high the speed on the level portion, the driver must slacken up very materially at the curve, as the bank is on the near side. The course is a series of curves and grades from bottom to top, which is 150 feet above the level starting point.

Pittsburg is noted for its hills, many of which are 15 to 25 per cent. grades, but the committee in choosing a course reasoned that only bad feeling would result in the selection of a course only fit to stall many machines useful on ordinary roads, while the main object is to see the behavior of the machines in the hands of experts on curves and hills ordinarily met with.

Six cups are to be contested for; one for each class, and a final for the first and second in each class. The six events will be for the following classes of cars: A, electric cars; B, steam cars; C, gasoline cars under 1,000 pounds; D, gasoline cars between 1,000 and 2,000 pounds; E, gasoline cars over 2,000 pounds; F, finals first and second in each class. The six trophies are offered by Reuben Miller, Jr., W. C. Temple, Geo. H. Flinn, Banker Brothers Company, Automobile Club of Pittsburg and the committee on contest, respectively.

Only machines belonging to members of the club will be allowed to enter. The contest is being organized by a committee composed of Thos. R. Hartley, chairman; Dr. John A. Hawkins and Geo. W. Hailman.

Gold Medal for the Herschmann Truck.

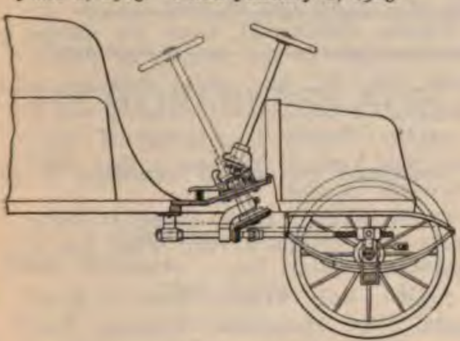
The Herschmann steam truck, which participated in the recent Commercial Vehicle contest, in New York city, and from which a medal was withheld on account of its not meeting the requirements stipulated for vehicles of its class, has at last been awarded a gold medal by the club committee in charge of the contest.

With the medal, however, a statement was issued to the effect that the l[illegible] weighed but 40 per cent.—[illegible] required 50 per cent.—[illegible] weight.

MOTOR VEHICLE PATENTS..

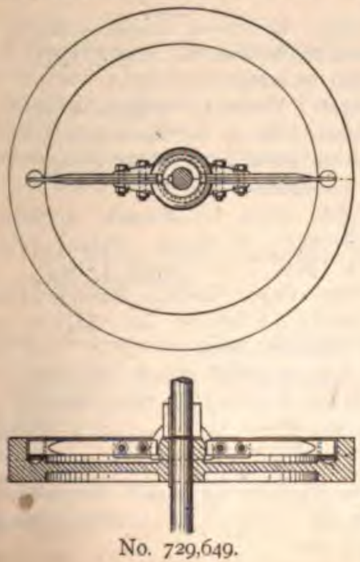
United States Patents.

729,538. Automobile Steering Apparatus. —Herbert H. Buffum, of Abington, Mass. June 2, 1903. Filed January 2, 1903.



No. 729,538.

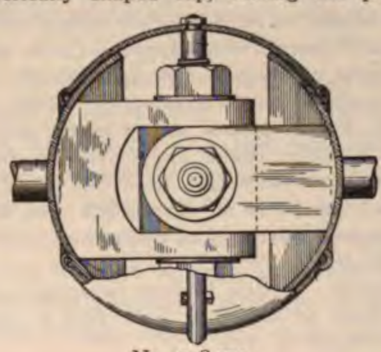
The novel points of this apparatus are the means of securing irreversibility of the gear and the means which permit the steering pillar to be thrown forward from the steersman's seat in order to enable him to enter and leave easily. The lower steering connections comprise a nut on the knuckle of the ground wheel, a horizontal longitudinal shaft mounted in stationary bearings on the vehicle body, and a rotary screw engaged with said nut and having a universal connection with the shaft to allow for the relative movements of the body and wheels due to the springs. This horizontal shaft connects, through a pair of bevel gears, with a short inclined shaft mounted in fixed bearings in the vehicle floor, and above this floor is a pivoted bearing which carries the steering pillar and permits the latter to swing toward and from the steersman into and out of alignment with the short inclined shaft. Such swinging movement also throws into and out of engagement the members of a toothed coupling carried, respectively, by the pillar and short shaft, which members when the shaft and pillar are in alignment properly connect the latter and transmit the movements of the pillar to the shaft, whereby the screw is caused to rotate in its nut and turn the steering wheel or wheels. A foot operated lever catch holds the steering pillar in its normal steering position. This arrangement has the advantage that the pillar can be quickly thrown forward when the steersman desires to enter or leave his seat and is then entirely out of the way, and, furthermore, this operation can be performed without moving the steering wheels, no matter what the position of the latter.



No. 729,649.

728,779. Casing for Universal Joints.— Clarence W. Spicer, of Ithaca, N. Y. May 19, 1903. Filed September 2, 1902.

The joint is enclosed by a shell of spherical form, but having polar orifices of considerable extent, through which the shafts project. This shell may be secured to one or both the pivot pins, as preferred. It is sufficient to connect it to one of them. For convenience in assembling the parts of the joint it is preferable to form the casing in two parts, which may be secured together by screws and nuts, as shown. Each of the two members of the joint carries a spherically shaped cap, closing the polar



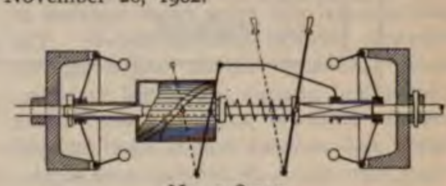
No. 728,779.

orifice through which that member of the joint projects and adapted to move with respect to the casing through a considerable angle while keeping such opening closed. The casing with the caps therefore completely encloses the working parts of the joint without interfering with free rotary motion of both members of the joint and without preventing free angular motion of one of the members with respect to the other. To prevent the entrance of dust the casing may be provided with grooved recesses, adapted to contain packing material.

729,649. Shaft Connection.—Henry Nyberg, of Kenosha, Wis. June 2, 1903. Filed June 19, 1902.

In a gasoline automobile one part of the hub of the flywheel is made in the form of a ball and fits a split socket piece keyed to the driving shaft. The two parts of the socket piece are each provided with laterally projecting flanges and secured together by means of bolts. A pair of laminated spring arms are securely clamped between the flanges of the socket piece and extend radially outward through slots in the rim of the flywheel. In order to permit the free bending of the springs, their outer extremities are seated in close fitting slots in cylindrical pins, which exactly fit recesses communicating with the slots. The pins have a slight turning movement in the recesses.

728,297. Regulating Device for Internal Combustion Engines.—Fritz Reichenbach, of Berlin, Germany, May 19, 1903. Filed November 26, 1902.



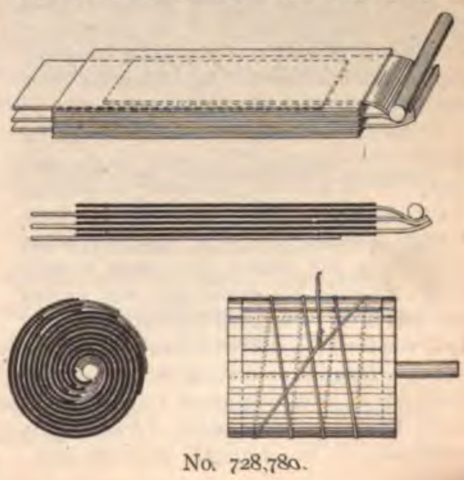
No. 728,297.

The device comprises two centrifugal governors, one of which normally operates both the ignition timing device and the charge throttle. The action of this governor is controllable by hand, a hand lever being provided for compressing the governor spring. The action of this governor is too advance the spark and to close the throttle as the speed of the engine increases. As the spark would not be advanced sufficiently when the governor spring is compressed, a second governor is provided which changes the position of the brush of the mechanical interrupter and thereby advances the time of spark.

728,780. Condenser.—Charles F. Splitdorf, of New York, N. Y.

This invention relates to condensers for jump spark coils, its characteristics being a compact circular form, enabling its enclosure adjacent to a coil within a common cylindrical casing, together with special facility and economy of manufacture.

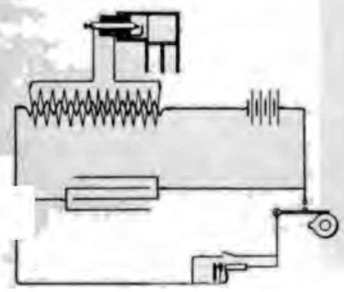
The improvement consists in forming into a roll a series of superimposed strips of tinfoil, which are alternately positive and negative condenser elements. Between each pair of such strips is interposed an insulating strip of paper, these latter having a relatively greater width to extend beyond the side edges of the condenser strips, and thereby properly insulate the positive and negative elements from each other. Lengthwise the arrangement of the metal and paper strips is such that corresponding ends of all the positive metal strips project



No. 728,780.

yond the paper and are in electrical connection, and the opposite ends of the nega- metal strips likewise project beyond paper strips and are in electrical contion. Thus one end of the series of ..ps is composed of contacting laminæ of itive sign, while the opposite end of the es is composed of contacting laminæ of negative sign. The laminæ at one end are initially wrapped about a terminal, as a wire or metal rod, being either soldered or otherwise securely attached thereto. The whole laminated bundle, comprising the positive and negative strips and the intermediate dielectric strips, is then wound tightly and compactly upon itself in convolute form about the terminal core to produce a roll of a desired thickness, according to the length of the strips employed. The respective outer ends of the negative strips, although conterminous when spread it length, are fanned out in the act of forming the roll, and this permits to make contact with each one by means of a wire ich is wound tightly around the roll, ding it together, this wire thereby form- g the opposite terminal of the condenser.

728,882. Electrical Ignition Apparatus for Gas Engines.—Willard E. Dow, of Braintree, Mass. May 26, 1903. Filed August 2, 1902.



No. 728,882.

As commonly constructed gas engines are provided with a current interrupter for the spark plug connected with the shaft of the engine and a high voltage apparatus comprising an induction coil, battery, condenser and vibrator. One of the difficulties experienced in connection with the above construction, especially when used for automobiles, is that when the speed becomes exceedingly rapid the vibrator is apt to cease to work or "stick," thereby short circuiting the sparking current; it is the purpose of the present invention to provide a construction which will prevent any ill effects from xcessive speed of the engine.

A mechanical interrupter and a magnetic buzzer are connected in series in the primary circuit and the condenser is shunted across both of these. The buzzer is necessary to produce the proper inductive effect in starting the engine and when it runs slow; but when the engine gets well started and increases its speed it becomes unimportant whether the buzzer works properly or not (and, in fact, it is often desirable to short circuit it by means of a switch), because there can be no short circuit of the condenser, as was formerly the case, inas-much as the mechanical interrupter is in the shunt circuit, and there is no possibility of a short circuit between it and the condenser around the latter. The result is that the condenser discharge is always effective every time a spark is required for the explosion chamber of the engine, and the condenser will be discharged either by the buzzer or by the mechanical interrupter of the engine, the former being relied upon for starting the engine and the latter after the engine has gained high speed.

729,313. Valve Gear.—Joseph T. Fenton, of Philadelphia, Pa. May 26, 1903. Filed February 11, 1903.

729,537. Piston Bearing Oiler.—Herbert H. Buffum, of Abington, Mass. June 2, 1903. Filed November 7, 1902.

The piston pin is tight in the connecting rod and has its bearings in the bosses on the inside of the piston. A groove on the outside of the piston is connected to an oil hole on top of the bosses referred to by means of a short tube. The oil groove is cut in such a position that it fills with oil from the cylinder oil cup at the end of the backward stroke.

729,652.—Motor.—Charles T. Osborne, of New York, N. Y. June 2, 1903. Filed September 27, 1901.

In a motor, the combination of an explosive engine, an air compressor driven thereby and having normally idle valves and passages enabling said compressor to run as an engine, an air reservoir receiving air from said compressor, an air engine aiding said explosive engine and driven by compressed air from said reservoir, all connected directly to the same crank shaft and a two way valve and its connections to said reservoir.

729,662. Electric Ignition Generator.—B. P. Remy, of Anderson, Ind. June 2, 1903. Filed April 17, 1902.

730,307. **Steam Motor** Vehicle.—Francis E. Stanley, Newton, Mass. June 9, 1903. Filed November 5, 1902.

730,353. **Automobile.**—George O. Draper, Hopedale, Mass. June 9, 1903. Filed December 26, 1902.

730,433. Gas or Oil Motor.—Stephen M. Balzer, New York, N. Y. June 9, 1903. Filed December 17, 1897.

730,519. Sparking Mechanism.—Joseph S. Dikeman, Torrington, Conn. June 9, 1903. Filed January 3, 1903.

730,597. Variable Driving Gear.—Stephen M. Balzer, New York, N. Y. June 9, 1903. Filed July 22, 1898.

730,608. Carbureting Device for Internal Combustion Engines.—Alanson P. Brush, Detroit, Mich. June 9, 1903. Filed March 7, 1902.

730,626. Internal Combustion Engine.—Frithiof G. Erickson, Stockholm, Sweden. June 9, 1903. Filed August 14, 1902.

730,628. Vehicle Tire.—William Esty, Laconia, N. H. June 9, 1903. Filed July 13, 1901.

730,649. Carburetor for Explosive Engines.—Carl O. Hedstrom, Portland, Conn. June 9, 1903. Filed May 10, 1902.

730,678. Friction Gearing.—Ludwig Maurer, Nuremberg, Germany. June 9, 1903. Filed May 15, 1902.

730,695. Explosion Engine.—Maurice Pivert, New Orleans, La. June 9, 1903. Filed June 5, 1902.

730,738. System of Splash Lubrication.—Alanson P. Brush, Detroit, Mich. June 9, 1903. Filed July 29, 1902.

728,268. Variable Speed Mechanism.—Frederick C. Miller, of Newport, Ky. May 19, 1903. Filed July 14, 1902.

728,420. Differential Gear for Motor Vehicles.—M. G. De Simone, of Spezia, Italy. May 19, 1903. Filed February 2, 1903.

729,550. Battery Jar.—George H. Condict, New York, N. Y. June 2, 1903. Filed December 16, 1898.

729,579. Motor Vehicle.—James D. Harp, Modesto, Cal. June 2, 1903. Filed July 5, 1902.

729,586. Road Vehicle.—Ernst G. Hoffmann, West Hampstead, England. June 2, 1903. Filed March 14, 1903.

729,602. Steam Engine.—Oliver W. Kelly, Springfield, Ohio. June 2, 1903. Filed May 31, 1902.

729,613. Fuel Feed Governor for Explosive Engines.—Imanuel Lauster, Augsburg, Germany. June 2, 1903. Filed July 15, 1902.

729,634. Vehicle Wheel.—Nathan G. Moore, Oakpark, Ill. June 2, 1903. Filed January 8, 1903.

729,737. Motor Vehicle.—Patrick J. Collins, Scranton, Pa. June 2, 1903. Filed May 20, 1902.

729,776. Controlling Mechanism for Automobiles.—Hermann Lemp and Otto F. Persson, Lynn, Mass. June 2, 1903. Filed January 30, 1901.

729,875. Change Speed Gear.—Jules Latille, Levallois-Perret, France. June 2, 1903. Filed May 31, 1902.

727,295. Tire Fastener.—Ralph M. Connable, Baltimore, Md. May 5, 1903. Filed February 4, 1903.

727,296. **Vehicle Tire and Fastening** therefor.—**Ralph M. Connable, Baltimore,** Md. May **5, 1903. Filed February 18,** 1903.

727,455. **Explosion Engine.—Martin H.** Rumpi, Paris, France. **May 5, 1903. Filed** October 25, 1901.

727,476. **Mixer for Explosive Gasoline** Engines.—**George W. Starr and John H.** Cogswell, Havana, Ill. **May 5, 1903. Filed** June 12, 1901.

727,496. **Plate for Electric Accumulat**ors.—**Donato Tommasi, Paris, France.** May 5, 1903. **Filed August 3, 1901.**

727,087. **Vapor Gasoline Burner.—Harry** M. Burnell, of Denver, Col. **May 5, 1903.** Filed January 2, 1902.

A steam carriage burner comprising an annular mixing chamber with straight jet tubes, the upper side of which is slotted.

727,923. Controlling **Mechanism for** Motor Vehicles.—Fay O. **Farwell, Dubuque, Ia.** May 12, 1903. **Filed Dece**ber 16, 1902.

THE HORSELESS AGE

...EVERY WEDNESDAY...

Devoted to Motor Interests

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Dangers of the Trolley Car.

Within the past three or four weeks there have been an alarming number of accidents due to collisions between automobiles and street cars. On May 31 an accident of this kind occurred in Cleveland, Ohio, in which one of the occupants of the auto was very seriously injured, and last week no less than three collisions were reported in New York city and vicinity, in all of which considerable material damage was done, and in at least one of them one person seriously hurt. All this goes to show that automobilists are not as cautious in regard to trolley cars as the dangerous nature of these vehicles demands. The fault lies not necessarily always with the automobile driver, but it is he, as a rule, who must bear the consequences. Although the total number of collisions with street cars to date is considerable, we have still to hear of a case in which damages have been recovered from a street car company. In the majority of cases recklessness of the automobile driver has undoubtedly been a contributing cause and in others it can only be conjectured that the public feeling against automobiles has made it impossible to hold the street railroad companies to make good the mistakes of their employees.

But, even leaving out of consideration the apparent impossibility of impartial treatment at the hands of juries at present, automobilists should do their best to avoid collision with street cars. Absolutely no chances should be taken in trying to cross closely in front of an approaching car, while it is supreme folly to drive close behind a fast moving trolley car, as did one of the parties that came to grief last week. A trolley car, being a public conveyance and confined to its track, is conceded certain privileges in the matter of precedence of way by the authorities, which automobilists should recognize. The collisions of the last few weeks have been so serious that they cannot fail to deeply impress upon automobilists the risks involved in running too close to trolley cars. Beware of the dangerous trolley!

Automobile Houses on Restricted Property.

The question has recently come up whether houses for storing automobiles can be erected on restricted plots which have been sold under agreement that no stables should be erected on them. Intending purchasers of the portable houses now offered in the market have particularly been confronted with this question. It appears to us absolutely beyond question that where the term "stable" is used in the conditions of sale it cannot possibly be interpreted to include automobile houses. The term "house" is universally employed for automobile buildings of the portable kind, and is also practically always applied to permanent buildings for storing automobiles. A house, of course, is not a stable, and hence restrictions on property excluding the erection of stables do not prevent the erection of automobile houses.

A further reason why the restrictions cannot prevent the erection of automobile houses is that the objections to horse stables which make them undesirable in residence districts are not present with the automobile houses. There is none of the bad smell and the general unsanitary conditions of a horse stable around an automobile house, and there is therefore no objection to it in a residential district.

A Technical Automobile Convention in Sight.

The Association of Licensed Automobile Manufacturers is making arrangements to organize a technical convention of automobile designers and builders, to be held at Niagara Falls some time next fall, probably in October. The idea of the association is that the convention should be at-

tended by the designers and superintendents from the different factories, and that these should travel to the place of meeting in cars of their own construction. An examination of the cars by the members of the convention is proposed and should prove very instructive, as it would not only tend to make designers more familiar with the detail construction of the latest cars, but would also reveal the effects upon the cars of the more or less extended trips to the place of meeting.

The Association of Licensed Automobile Manufacturers comprises among its members only manufacturers of gasoline cars, but it is not stated whether the congress is to be restricted to engineers interested in cars of this motive power. It appears that the relationship established between manufacturers through the A. L. A. M. makes the conditions for holding a successful technical convention of this kind exceptionally favorable, and the proposal furnishes an instance of how the new association can be instrumental in furthering the advancement of automobile construction.

Even more desirable than a technical convention would be a convention or congress of automobile owners, as recently suggested in these columns, to inaugurate an effective campaign against unreasonable legislation and the causes leading to it.

Missouri's Drastic Law.

In the excitement manifested over the Bailey law the very much more restrictive and objectionable legislation in several Western States, particularly Missouri, has apparently remained unnoticed in automobile centres. The Missouri law, which was printed in full in our last issue, actually requires automobilists to stop whenever they meet a horse vehicle and remain stationary until the latter has passed, and limits speed everywhere to 9 miles an hour. This is by far the lowest limit of speed that has yet been enforced anywhere for the open country, and is far below what is reasonable and proper. It is a significant fact that this law was adopted by a body of legislators which has become notorious for the implication of its members in boodling scandals. The provision requiring a stop on meeting a horse vehicle is impracticable on the face of it, since, in order to comply with it in a city, an automobilist might have to stop for an hour or longer pending a continual procession of traffic in the opposite direction.

It is impossible to see how a law of this nature could be upheld by the courts. The requirement that an automobilist must stop whenever he meets a horse vehicle, without regard to whether the horse shows fright or not, is plainly a violation of the fundamental principle that automobiles have as much right upon the highway as other vehicles, which has repeatedly received judicial affirmation.

Missouri may be an agricultural State and have little regard for automobile interests, but this cannot change the fundamental principles regarding the road rights of automobiles.

The Chicago-Mammoth Cave Club Run.

A decidedly novel event in the history of automobilism in this country will be the fourteen days' club run from Chicago to Mammoth Cave, Kentucky, and back, which the Chicago Automobile Club will start on Thursday, June 25. The run is organized as a strictly social affair devoid of any commercial interests; it is to be accomplished in easy stages of from 40 to 120 miles a day, and every effort is to be made to discourage speeding. At the time of writing it is expected that about twenty-five cars carrying about seventy-five people will start from Chicago, and at Indianapolis and Cincinnati members of the local clubs will join the procession.

Considerable interest has been aroused in this event in Chicago, and, provided the weather turns out favorable, it will undoubtedly be the chief event of the season in the West. The route comprises all varieties of roads met with in the Middle West, from the improved level highways of Central Indiana to the mountainous dirt roads found in Kentucky. In the State of Indiana large numbers of automobiles are owned, and the tourists will undoubtedly receive a warm reception at the different intermediate stations and draw considerable attention en route.

Racing Under a Restricted Cylinder Volume Rule.

The suggestion has recently been made, apparently simultaneously in different quarters, that in future road races the ratio of cylinder volume to weight of car should be limited, and a convention of the leading national clubs has been proposed to be held shortly after the Gordon Bennett race, for the purpose of deciding upon suitable restrictions of this kind. The object of these restrictions is stated to be to deprive road racing of some of its dangers and to render it of more practical value.

It cannot be denied that the danger factor in racing would diminish with the proportion of cylinder volume to weight of car, but it would be idle to expect any material beneficial influence on the design of ordinary cars from speed contests held under these restrictions. The argument is advanced that when the cylinder volume is limited the only means of securing higher speed is by reducing bearing friction and by improving the resiliency of tires. It is obvious, however, that the factors of bearing friction and tire resiliency were equally important in races as conducted up to the present time.

For purposes of improving the design of ordinary cars a speed contest is of no avail, because it is not in the direction of speed that improvement is needed. The demand is not for a car which, restricted to a certain weight or cylinder volume, will do a certain distance in the shortest possible time, but for a car that combines in the highest degree the qualities of reliability, safety, comfort and economy of operation with the ability to take all ordinary road obstacles and maintain a reasonable average speed. Consequently it is the qualities of reliability, safety and economy that should form the basis of a practical competition and not speed.

As an example of how the cylinder volume restriction might lead designers off the true course of progress we mention the subject of cylinder proportions. It is well known that a 4x4 inch cylinder, for instance, will give more power per unit of volume than a 4x6 inch cylinder; yet a majority of designers of horizontal engines, which may be either of short or long stroke, prefer the long stroke engine, considering it more economical of fuel and more durable. The designer of an engine for a racing car under the restricted cylinder volume rule would, of course, choose a short stroke, as his only aim would be maximum power per unit volume, and durability and fuel economy would be of no consequence.

Touring in America.

In the present issue we print the first instalment of a series of articles on automobile touring. From our correspondence we know that there are many among our readers who are contemplating tours this summer, but often they find it difficult to decide upon the best

routes to take. Much of the pleasure of an automobile tour depends upon where it is taken—the roads, the scenery and the places of historical interest visited. Information regarding particularly interesting touring routes will therefore undoubtedly be appreciated by many readers, and it is this information that the articles are intended to give. The author of the series, having spent his whole time during the last two years in studying the touring problem and establishing a system of supply stations for tourists, is therefore well qualified to write on this subject.

Calendar of Automobile Dates and Events.

June 25.—Start of Chicago A. C.'s Run to Mammoth Cave.

July 1—15.—Irish Fortnight.

July 2.—Gordon Bennett Cup Race.

July 3, 4 and 5—Endurance Run of the New York Motor Cycle Club to Boston and return.

July 12—19—Ostend Automobile Week.

July 24—Quarterly 100 Miles Trial of A. C. G. B. I.

August 10—22—Tourist Motor Bicycle Reliability Trials.

Lubrication.

By Albert L. Clough.

The subject of lubrication is rather an uninteresting one, and often seems to be dwelt upon unduly. Nevertheless its importance is such as to demand no apologies. Failure of proper lubrication is admittedly the most common cause of injury to automobile mechanisms, and it is especially to be noted that these injuries most often occur in the early use of a machine before the operator thoroughly understands the demand for oil existing in its different moving parts or even understands what the parts themselves are, where located, and how supplied with lubricant. It has too often been the case that in the first or second trip with a new machine some damage has resulted from faulty lubrication, and it is certainly too bad to take chances with a new machine which may lead to permanent injury and a great deal of expense through failure to properly provide for its oiling. After a machine has been operated for some time, its lubrication becomes habitual with the owner, and there is very little chance of damage resulting under these circumstances.

A great many people are

RECEIVING NEW MACHINES

at this season of the year, and a great many of them are being shipped to their owners without competent demonstrators accompanying them. Sometimes the instructions for oiling are very meagre, and it seems to be a common fault in the literature received from the manufacturers to make the oiling operations appear very easy and unimportant, apparently with the idea of impressing the owner with the slight amount of care required by the machine.

It would be a wise precaution if upon the receipt of a new machine the owner should first become acquainted with every detail of the lubricating mechanism; not only with every part which can possibly require lubrication, but to become thoroughly familiar with its oil supply, to note its rate of feeding and not be contented with the mere fact that oil is supplied, but be sure that the oil actually reaches the point of use through the appropriate pipes or channels. Where the oil pursues a devious path in reaching the bearing, as in a crank shaft, one should be satisfied that the oil channels are all clear and free.

NECESSITY OF PROPER LUBRICATION.

There are a great many different points of attention about an automobile, failure to attend to which will result only in inconvenience and not in damage and loss; but the matter of lubrication is one the neglect of which is sure to be serious. A case was observed recently of a machine of reputable make which had been nearly ruined by lack of lubrication. The crank shaft had been broken owing to its bearings having been allowed to run dry and heat excessively. The final binding of these bearings and the unusual strains thus thrown upon the shaft, together with its very high temperature, caused its failure. When it gave way the connecting rod was bent almost beyond hope of repair, one of the balance weights was broken and the hub of the flywheel was cracked by the terrific jerk which took place when the engine finally stopped. The crank case was fortunately not broken. Some of the bushings of the transmission gear shafts were badly worn from lack of lubrication, the roller bearings of the rear axle were both entirely ruined, having been allowed to run dry, and the clutch had been worn almost to its limit of adjustment through the same cause. To put this car into running condition will be a large expense, and it is all directly attributable to lack of lubrication.

STUDY THE LUBRICATING SYSTEM.

It requires some self restraint to forego the pleasure of operating a newly received vehicle before looking it over mechanically, but this slight sacrifice is certainly warranted in the better understanding of the vehicle and its needs which will come from a careful inspection with the aid of a first class mechanic, or, still better, an operator of the same make of vehicle. If one would surely avoid injury to the vehicle at the start, with its effect upon all its future operation, he certainly should look to the oiling mechanism before operating the carriage at all.

There is one thing which makes toward conscientious lubrication, and that is the provision of convenient

FACILITIES FOR HANDLING AND STORING

oils and a good light to enable the operator to definitely ascertain whether his oil is going to the right point. Sometimes the difference between convenient oiling arrangements and inconvenient ones will be sufficient to determine whether the machine receives any oil at all, and possibly determine the fate of some part of its mechanism. It is good judgment to have lubricating oils kept in receptacles from which they can be pumped or drawn without the necessity of pouring from a heavy can. They are much more cleanly when kept in this manner and the cans provided with small drip pans. A stable may well be equipped with oil cans of the most convenient forms to reach the most inaccessible parts of the mechanism, as, in case oiling is made convenient, there is less liability of its being neglected.

AN INCANDESCENT LAMP

on a flexible cord is almost necessary to examine the lubrication of concealed parts of the mechanism. A machine which is easily accessible in all its parts is likely to have a longer life than one otherwise constructed, on account of the greater liability of its receiving proper lubrication. The lubrication of a machine in which the parts are crowded or which cannot be readily exposed to view is almost sure to be neglected, unless its owner is more conscientious than the average.

Probably the majority of machines are lubricated by means of sight feed gravity lubricators, and these require adjustment to pass the proper quantity of oil at the working temperature of the machine. The best time to adjust them is upon returning from a trip with the engine thoroughly warmed up. By placing an incandescent lamp behind the sight feeds, their action can be easily noted and regulated. The desirability of an oil which has every quality as a lubricant and still is not much altered in thickness by temperature changes is most apparent, as a correct set of a lubricator can be readily made with such a lubricant. Fortunately, cylinder oils having all the necessary good qualities in a satisfactory degree can be obtained.

ONLY ONE QUALITY OF OIL.

It is a great convenience to be able to use one quality of oil for all the requirements of the machine, both for cylinder lubrication and the oiling of other moving parts. This practice is perhaps not scientific, but is fairly successful where a good oil is chosen, primarily of such quality as to be successful in the cylinder. This should be found suitable for the gears of the transmission, for the clutches and for the main bearings. If one could have only one oil to carry on a tour it should certainly be a good cylinder oil of very high fire test and sufficient but not excessive body.

Vehicles which have gravity feed multiple oilers, even when provided with sight feeds, sometimes suffer as to their lubrication by the stopping up of the long and sometimes circuitous pipes which convey the oil from the magazine to the bearings. One should not take for granted that the bearing or other part is receiving lubrica-

tion simply because the oil appears at the sight feed. The force feed multiple mechanical oiler, as ordinarily constructed, is the most positive method in general use for oiling bearings, and as long as its mechanism is in operation, with a proper adjustment at the start, one may feel reasonably sure that lubrication is being effected. Still, it is sometimes possible to have one or more of the flow pipes stopped up and their bearings run dry, as the free pipes take care of all the oil which is forced by the mechanism.

It is the writer's experience that

A HEAVY OIL

is the lubricant of most use about an automobile, but many may differ with this view. Its use upon the wearing surfaces of clutches is much to be preferred over that of a light lubricant, as is the case generally where heavy pressures are the rule. The use of an oil of this quality in crank case lubrication of enclosed gears is accepted. Axle and wheel bearings are very often packed in vaseline or a similar preparation, if they are of the ball or roller type. Some of the statements as to the length of time that bearings so lubricated will run without injury seem to be exaggerated, and too often they are inspected only after some damage has been done to the balls or rollers. It is ordinarily very inconvenient to lubricate these bearings, especially those of the front wheels, particularly when of the wood type. In many, if not all, of these wood wheels it is necessary to remove the entire wheel, after jacking the machine up, in order to supply the bearings with lubricant. It would seem as if there should be means provided for the lubrication without this apparently unnecessary trouble. Heavy cylinder oil acts very well on roller and ball bearings so far as the writer's experience goes.

GEARS AND CHAINS.

Owners who are unfortunate enough to have exposed gears about their machines will find them a most difficult part to properly lubricate, as it is necessary to find some good lubricant which will not throw off on account of its being either too thin or too hard, and which always will keep a film between the teeth of the opposing gears. Many use graphite preparations with success, but dry graphite seems to be crowded away from the points of wear, and graphite mixed with heavy grease acts in about the same way. A vacuum grease somewhat thickened with cylinder oil, so as to be quite sticky and yet not thickened enough to be readily thrown off, appears to answer very well in a great many cases.

The method of lubrication of chains is too generally known from experience with bicycles to require any mention, although almost everyone has a way of his own. For chain lubrication graphite has certainly won a pre-eminent position.

IN GENERAL

it may be said that nothing should be taken for granted in the lubrication of an automobile. Everything should be done to make the work of lubrication as easy as possible by having every convenience at hand. Heavy oils are more valuable than thin machine oils, apparently owing to the high temperature attained by the whole machine. The plugs designed for the drawing off of the spent oil from crank cases should be carefully looked after to see that they cannot drop out while running. If an undue amount of oil drips from any particular point of the machine it may indicate either that the supply is excessive, that means for retaining it are not proper, or that the oil is too thin. Thick oil on the whole gives little trouble from working out of bearings, especially when everything is hot. A great many "pointers" in regard to the lubrication of a machine are likely to be obtained when cleaning it. The "wiping off" of a machine is a duty which no one having the instincts of a mechanic will shirk, as the dust which an excess of oil on the outside surfaces of the wearing parts is constantly collecting proves very injurious to the mechanism.

Commercial Motor Vehicles in France.

By Dr. Leon Guillet.

(Continued.)

THE PANHARD-LEVASSOR TRUCK.

The firm of Panhard & Levassor are building a number of types of commercial vehicles. We shall here describe only the latest type of truck manufactured by this concern, which has received its tests on various occasions, particularly during the great manœuvres.

The propelling power is, of course, a gasoline motor, and the vehicle in general possesses all the characteristics of the Panhard system. The motor is a four cylinder one of about 8 horse power; it is of the vertical pattern (Phenix type), and is located at A, practically in the axis of the frame and within a case B. The motor has hot tube ignition and a hit and miss governor, cutting out explosions by letting the exhaust valve remain closed. The motor, through a conical friction clutch C, drives the sliding gear transmission located within the case D. By means of bevel gears motion is transmitted to the countershaft E parallel with the stationary rear axle K. This countershaft carries the differential gear and communicates motion to the two rear drivers H and H' by means of the chains I I'.

Steering is effected by means of a divided front axle, pivots F F' and a connecting rod G. M is the body springs and N the motor starting crank. The operator by turning the hand wheel P operates a reducing pinion at the lower end of the steering post in mesh with a toothed sector. The latter connects to G by the link L. The lever R permits the operator to obtain forward motion, reverse motion, or a disconnection of the gear, by placing it on one or the other of three notches of the quadrant. The lever S serves to operate the change gear. The band brake O on the differential is operated by means of a pedal, and the rear wheel brakes T T by means of a hand wheel V at the side of the seat. A second pedal serves to operate the friction clutch.

The running gear here described lends itself to a large variety of bodies. The available platform is 12 feet long and 50 inches wide. The total length of the vehicle is 20 feet, and the width 7 feet. The weight empty is approximately 1,800 kilogs, (4,000 pounds), and the load capacity 2,000 kilogs. (4,400 pounds). The speed may be varied from 5 to 14 kilometres per hour (about 3 to 9 miles per hour).

A considerable number of these trucks are in use by the large department stores of Paris, by manufacturing establishments and by the Central Sugar Refinery, of Cambray (Departement du Nord), where they are used for the transportation work of the establishment. It should be added that two trucks of this type participated in the great manœuvres of 1900 with complete success, being used for the transportation of forage, ammunition, food, and even men.

SCOTTE STEAM TRACTORS.

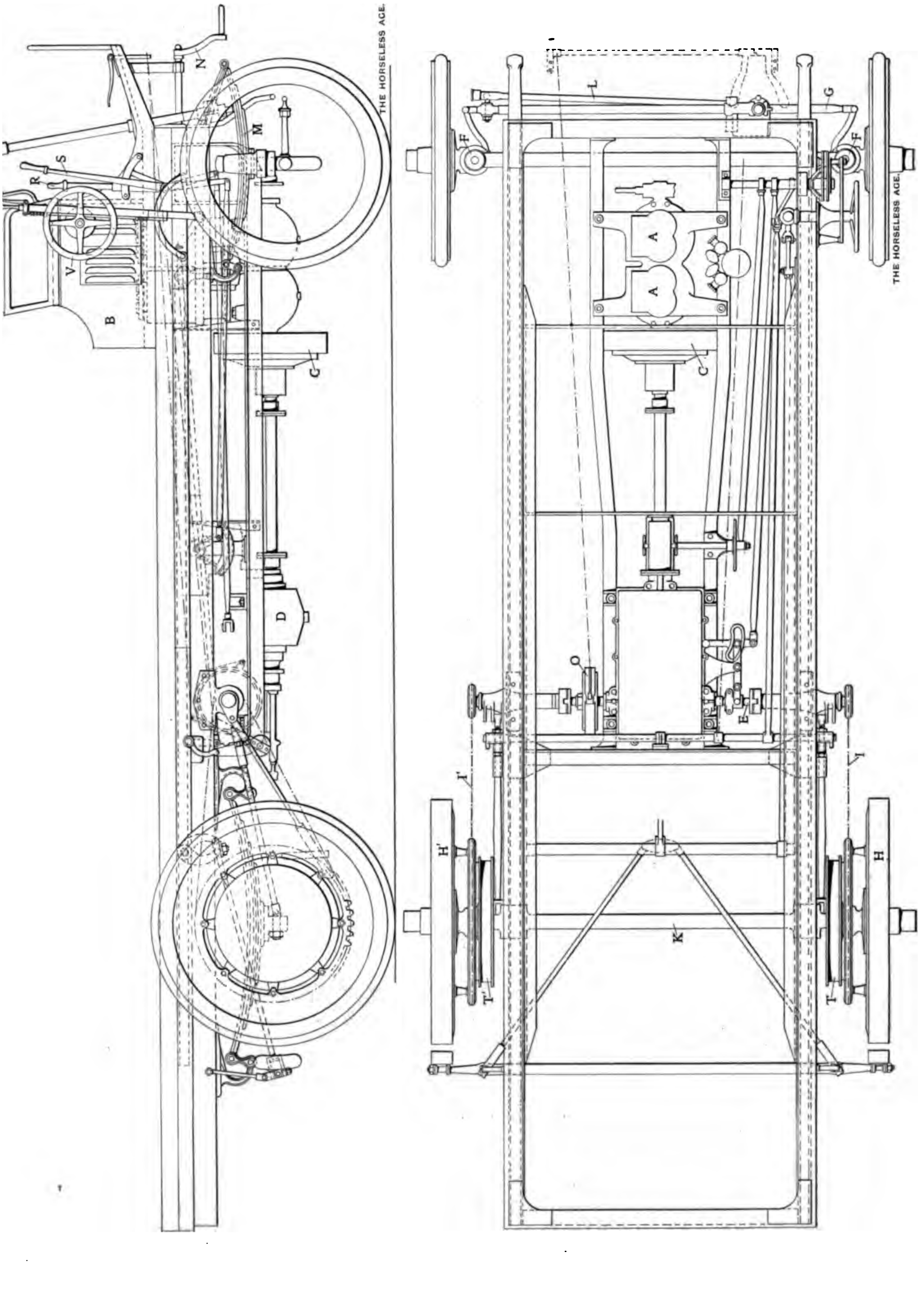
The Scotte Steam Boiler and Wagon Company was the first firm in France to take up the problem of motor traction on roads. Instead of building self propelling trucks, as is the usual practice at present, the firm built tractors for hauling one or more trailers carrying the load, the combination being known as the train Scotte. At the commercial vehicle competition organized by the Automobile Club of France, in August, 1897, this firm for the first time presented steam vehicles hauling net loads of over 10 tons. At present the company manufactures three types of tractors of different powers.

The first type has a power equipment capable of developing 12 horse power continuously and 20 horse power for short periods; it is capable of hauling a load of 5 metric tons, has a total length of 14 feet, a width of 74 inches and a track of 72 inches. The height over all, comprising the chimney, is 10 feet 4 inches and the platform area measures 27 square feet.

The second type has a power equipment capable of producing 20 horse power continuously and 35 horse power momentarily. It is designed to carry a load of 10 metric tons. The platform area is equal to 38 square feet, the total length of the tractor to 16 feet 2 inches and the height to 10 feet 4 inches. The greatest width is 80 inches and the track 76 inches.

The third type has a power equipment of 30 horse power, capable of being forced to 50 horse power, and is designed for loads up to 15 metric tons. Its total length is 16 feet 2 inches, its total width 80 inches, its track 76 inches, and its height 10 feet 8 inches.

The medium size tractor of 20 horse power seems to be the most suitable for



Elevation and Plan of Eight Horse Power Panhard Gasoline Motor Truck.

the requirements of transportation at factories. The running gear frame of all these vehicles is constructed entirely of steel, and cross braces and riveted gusset plates insure a very solid construction.

The boiler is of the vertical cylindrical type, on the Scotte system, with rapid circulation and designed for a working pressure of 225 pounds. It is located behind the engine and occupies the entire width of the frame. The boiler is easily cleaned, two openings in the wall of the water space permitting the removal of all the tubes of the boiler in a few minutes and also the layer of incrustation which may have formed. The engine is a double cylinder vertical compound and is located at the extreme front of the tractor; it is completely enclosed in a casing which thoroughly protects it from the dust of the road and prevents loss of oil. The crank chamber forms an oil bath, which insures thorough lubrication of the crank and connecting rod bearings and the eccentrics, and the other moving parts are supplied with oil by an automatic lubricator with pressure feed.

Motion is transmitted from the engine to the driving wheels by means of chains. Speed changes are obtained by means of sliding pinions in mesh with gear wheels keyed to the intermediary shaft of the transmission. Each vehicle is provided with a two speed gear, the two speeds being 4 and 8 kilometres (2½ and 5 miles) per hour, or 5 and 10 kilometres respectively, at the option of the purchaser. The wagons are equipped with two brakes, very 'erful and rapid acting. One of these, a d brake which acts upon drums fixed to the driving wheels, is operated by a pedal. The other is a shoe brake, acts directly on the rear wheel tires and is operated by a hand wheel.

Before concluding the description of the Scotte vehicles mention should be made of the military tractor of this firm. For a considerable time France has been interested in the question of the use of motor vehicles in the army, and particularly the use of heavy goods vehicles for transporting army provisions. Particular efforts were made during the great manœuvres at Beauce in 1900 to determine the type of machine best adapted to the various kinds of work, the transportation of food, ammunition, etc. The most important question was the comparative practicability of motor trucks and of trains composed of a tractor and trailer vehicles, the ordinary army wagons to be used as trailers. The result of these trials was that preference was given to the latter type, chiefly on account of the too great weight of vehicles carrying both the motor equipment and load, and the difficulties which would be encountered with such heavy vehicles. The great manœuvres held in the East in 1901 confirmed these results, and at the conclusion of these manœuvres an order was placed with the Société Scotte for a number of vehicles of the type to be described.

All the parts of the power equipment of these vehicles are placed at the front of the vehicle, convenient to the driver, and none of these parts below the frame. The greatest width of the vehicle is 64 inches; the length 16½ feet. The engine is of the compound type and develops 35 horse power. The weight in running order is somewhat less than 15,400 pounds. The capacity for supplies is such as to permit the machine to cover a distance of 60 kilometres (37½ miles) on one supply of water and 100 kilometres (62 miles) on one charge of fuel. These machines may attain a speed of from 6 to 10 kilometres (3¾ to 6¼ miles) per hour with full load, propel a load of 10 tons up a grade of 8 per cent. and a load of 6 tons up a grade of 10 per cent. This tractor is fitted with the company's special anti-skidding tires, consisting of wood blocks upon a steel base.

SOCIETE NANCEENNE GASOLINE TRUCK.

The Société Nanceénne builds motor trucks equipped with the Brillie gasoline motor, which has two pistons in a single cylinder. One of these pistons is connected to the crank directly, by means of a connecting rod attached at its centre, while the other acts upon the crank shaft through the intermediary of a transverse beam and two connecting rods, one on each side of the cylinder. The motor and truck have both been described in The Horseless Age, the latter in the issue of December 11, 1901, and there is therefore no need of going any further into details here.

ELECTRIC COMMERCIAL WAGONS.

For the sake of completeness we must make mention of the numerous types of electric automobiles which may be classed under the head of commercial vehicles. These vehicles are, however, not sufficiently developed to be of any particular interest. The practicability of these vehicles hinges chiefly upon two points—the manufacture of storage batteries and the establishment of charging stations or charging posts. The question of accumulator construction is outside the scope of this article, and as regards charging stations, it is well known that the problem is still in its infancy, except in the large cities. Consequently, until further developments, commercial vehicles of the electric type must be regarded as limited to service in large cities, or at least within a short radius from a given central point. Finally, it may be observed that the high price of this form of energy does not seem to permit a very great development in this class of vehicles. It is necessary to mention, however, that in Paris particularly the large department stores use electric delivery wagons.

Leon Auscher has written a treatise on "The Science of Automobile Touring." It may be news to some that automobile touring is a science, and there are certainly those among the experienced who would object to classing it among the exact sciences.

Detail of Poppet Valves.

By Hugh D. Meier.

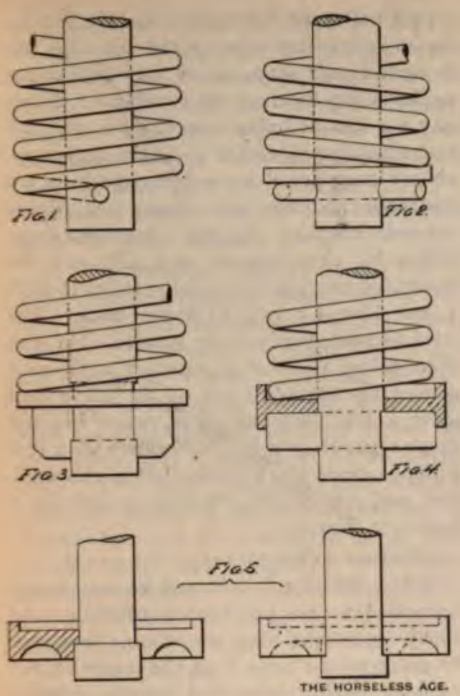
Every careful designer of internal combustion engines employing poppet valves has found that it is no easy matter to provide a satisfactory means of securing the coiled spring to the valve stem. Relatively an unimportant part, there are many different ways of doing this, and which method of fastening fulfills all the requirements best each draughtsman will have to decide for himself. The merits and demerits of all the methods should be weighed in the balance before a decision is reached, as it is desirable to adopt a standard that will not prove wanting in practice. In this connection the personal equation must be considered. For this reason preference will be given to none of the various systems illustrated by the accompanying sketches, selection being left to the reader.

In Fig. 1 the spring is bent to an elbow at the bottom and passes through the valve stem, no washer being provided. This is the simplest form that has been extensively used. Unless a change has very recently been made this type is still employed in the Daimler-Mercedes vehicles. To prevent the spring from rubbing against the valve stem the former is made of large diameter. All springs that are secured in this way have a pronounced tendency to buckle, so that a good deal of clearance between the spring and the valve stem must be allowed, to guard against rubbing. It is not apparent how such a spring can come out unless forced out purposely.

In Fig. 2 a somewhat similar method is shown. The spring rests on a washer, which in turn rests on a split pin that has been passed through the valve stem. Buckling of this spring may take place, but not to such an extent as in the first one. A suitable split pin will satisfy the requirements and remain in place, provided its ends have been sufficiently spread. Like its prototype, this method simply requires a hole to be drilled into the valve stem.

In Fig. 3 a washer is employed which rests on a double gib head key. First, a number of holes are drilled into the valve stem and then a broach is forced through. Filing finishes the operation. The rectangular hole thus produced must have a slightly greater width than the key and must be of such a height as to permit the insertion of the key. To do this the washer must be forced up against the spring sufficiently to allow the key to be slipped into place.

In Fig. 4 a plain key with a recessed washer is employed, the former supporting the latter, while the washer keeps the key from coming out. This method is a modification of the other one (just described) and appears to have the same advantages. De Dion-Bouton have employed a combination of the two by the use of the gib head key of Fig. 3 and the recessed washer of Fig. 4. In criticism of this r it might be said that it re to be raised a greater ar



key than do the fastenings illustrated in the cuts. On the other hand, the key is less liable to come out. To guard against this the spring should be kept under sufficient tension at all times, which condition is amply fulfilled in an exhaust valve, because the spring is obliged to keep the valve to its seat, no matter how high the partial vacuum may be in the cylinder at the time the charge is being drawn in.

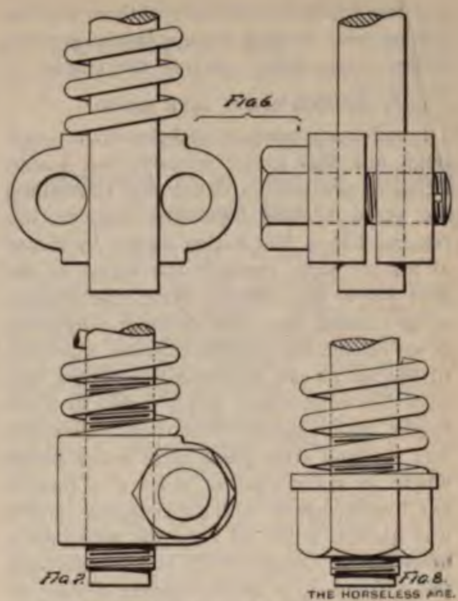
In Fig. 5 an equally ingenious method of providing a rest for the spring is shown. After the valve stem has been turned up a groove is turned into it. The washer has a slot milled into it so that it can be slipped over the neck of the stem. Once in position, the spring presses the washer down against the square shoulder. The drawings show a sectional and an end view of this arrangement for the sake of clearness. It is quite evident that the principles that guided the originator of this type were also employed by the inventors of designs 3 and 4.

Automobile manufacturers have not used the system shown in Fig. 6 very extensively, although it is regarded with favor by a number of builders of stationary gas engines. Two caps of the same pattern are here employed. They are bored out and reamed together and clamped securely to the valve stem by means of two bolts, four being sometimes used. Although in the illustrations cap screws are employed, studs will answer just as well and bolts even better. A threaded stem and tapped caps can obviously not be applicable. Means for properly securing the screws should, therefore, be provided. A split pin in each screw will keep the latter from coming out, but cannot prevent the screw from coming loose. Only a very little give is needed to permit the spring to push the fitting off of the valve stem. Unlike all the former and like the following arrangements, this fitting provides means for increasing the spring tension. After the nuts or bolts have been backed off, the caps must be raised with a suitable bar or forked lever until the spring tension has been increased the desired amount, when the screws must again be tightened up.

The fitting shown in Fig. 7 is similar to the one last described. Instead of two caps there is a tapped hub which is split. A screw or bolt is provided to bind this fitting, which in principle is but a nut, and a much better way of securing a nut than by clamping can hardly be devised. This spring rest does not require a threaded valve stem. However, it is well to thread the latter, because the fitting cannot come off, whereas one should feel apprehensive about a clip without a thread, at least in the hands of the untrained motorist.

Fig. 8 illustrates a method in which a washer and nut are used. Not infrequently a lock nut is added, although a plain nut seems to have no tendency to unscrew under the heavy pressure of the exhaust valve spring. A cotter pin should not be forgotten if a nut and washer are intended for use in connection with an inlet valve of the automatic type. It appears that a nut will not remain in place unless the pressure which the spring exerts will create enough friction to prevent rotation of the nut.

The accompanying cuts by no means illustrate all the methods that are in extensive use. There are many other ways of accomplishing satisfactory results. A combination of two or more of some of the methods described may readily be made, as well as variations of them. It may seem that there is no more room for improvement, but it is certainly profitable to devote time and study even to so small a matter



as this. The question—Is it well to provide for adjustment of the spring, or will a spring that has done duty on the testing block do for all time?—cannot be answered in the abstract. In Figs. 2 to 5 (inclusive) the spring tension can only be increased by inserting washers between the spring and the original washer. In Fig. 1 this cannot be done, and stretching of the spring, unless it be done properly and in the shop, ought not be resorted to. Should the valve stem bind for any reason while en route, tightening up of the spring may correct the trouble. Removing the valve and polishing the stem would have to be resorted to in cases 1 to 5, unless the stem can be limbered up by "working" it or by the injection of kerosene into the space between the rod and its guide.

LESSONS OF THE ROAD

Two Years' Experience with a Gasoline Carriage.

By J. H.

(Concluded.*)

I felt quite proud of my carriage when I had completed the last of the improvements and longed for an opportunity to see how much better it would run. I had lowered the sloping front about 8 inches, having it made with a door in front, which gave me a lot of room for carrying things likely to be needed on a trip; also for extra coats or wraps. I sent two of my tires that were worn quite badly to the factory, and had new outer coverings of rubber vulcanized on, making what is known as full mold repair, and they came back to me looking as good as new ones.

We planned to take our first trip on Lexington Day, and intended to run to Lexington to witness the celebration to be held in commemoration of the day, but finally changed our plans and went to Boston. We were accompanied on the trip by a friend, who during the winter had purchased a machine the same make as mine, but of 1902 model. The new carriage had the same size motor as mine, but owing to more direct drive, doing away with the countershaft and a transmission device running in oil, which insured perfect lubrication of the bearings and clutches, it had more power available for driving purposes, less being lost in transmission, which enabled it to travel quite a little faster than mine.

We left Lawrence at 10 o'clock, met our friends in Andover, where they resided, and laid our course through Reading, Stoneham, Winchester, Arlington and Belmont into Boston, a distance of 35 miles. We arrived at 12:30, everything having worked smoothly on the trip. We put the machines up at the auto station and went to lunch. We started on our return trip at 4 p. m., arriving home a little after 6, having run 70 miles without any trouble, and upon examining the new lubricators I found them to be two-thirds full of oil. The amount I had used would not have carried me more than a dozen miles with the old oilers, and as for the magneto, it

* See The Horseless Age of February 25, 1902.

had run the entire distance without any attention, and without having to use my batteries, except when starting the engine.

AN AIR VALVE LOCK ADDED.

I had made another addition to my carriage, and also to my friend's, that I neglected to mention—a device for controlling the speed by the foot. Our engines are regulated by a foot button which, by means of air pressure, controls the travel of the inlet valve, and thereby varies the amount of gas taken into the cylinder. Pressing down on the foot button allowed a portion of the air to escape through a bypass, and gave the inlet valve more travel and the engine more speed. We found, however, that on long trips there were many places where we could run for miles at a time at our highest speed without changing, and it was quite a strain to keep the foot button down to the proper point, and to overcome this I fitted up a simple ratchet device, directly over the button, that holds it any point it is set at. This locking device is operated by the foot, and in no way interferes with the operation of the button if one wants to use it without the attachment.

We found this to be a great convenience, as it not only relieved us of the strain of keeping our foot as well as our minds on the button, but by keeping the button from jumping up and down on rough roads, the engines ran much more evenly.

The following week we took a trip to Waltham, about 30 miles from our town. Had a beautiful trip out there and had got as far as Winchester on our return trip when my friend's machine stopped just as he crossed the railroad tracks in the centre of the town,

A BROKEN BELT

on the pump and dynamo being the cause. We quickly repaired this, and were soon on our way again.

We had driven about 2 miles when the ladies suggested that we stop and partake of a light lunch they had brought with them. We soon found a cool place and stopped for refreshments. We had arranged our lunch on a flat stone and started to enjoy it when I happened to glance toward my machine and noticed that one of the rear tires was flat. This didn't improve my appetite any, but nevertheless we finished the lunch, and then looked for the trouble. A good sized nail had been driven through the tire clear to the rim. We had no means of repairing it, as it was a single tube and very thick and heavy, so we had to run it into a near by barn, send the ladies home on the electrics, while my friend and I removed the injured wind bag and brought it home in his machine.

It was sent away for repairs, and when it was returned a week later we drove down and put it on by moonlight.

TIRE REPAIR OUTFIT NEEDED.

This second experience made it plain to me that it was not advisable to go far from home without either an extra tire or the means to repair one in case of puncture. So the following week I purchased a repair outfit for $2 that prevented cold chills from running down my spinal column every time I saw a nail in the road, and that enabled me to make several temporary repairs on the road which got me home all right.

We next took a trip to Lynn, Mass., where we had dinner, and then drove to Salem, where my

CHAIN BECAME SO LOOSE

while driving up the main street that we had to stop and adjust it before a large and appreciative audience, composed largely of the juvenile population of the town.

One of the youngsters wanted to know if "dat was Damon's machine." When I informed him that it was not, he remarked: "Chee, I thought it was; he's always breaking down." I assured him, however, that, while Mr. Damon held the record in that line at present, I was a close second, with every prospect of holding first place before the close of the season if my luck didn't change.

On our way home the belt of my friend's machine gave out again, and delayed us a few minutes. While repairing it two ladies drove up with a spirited horse, and, although both machines were at one side of the road and the motors stopped, he proceeded to make things lively for the occupants of the carriage. I endeavored to lead him by, but it took the combined efforts of both my friend and I to get them safely past the autos.

We then completed our repairs on the belt and resumed our trip, arriving home just in time for supper.

75 MILES IN FIVE HOURS.

We took several short drives during the following week, and planned to run to Providence on Decoration Day. This was about 75 miles from our town, so we got an early start and made the run in six hours, stopping one hour for dinner, making the running time five hours. We left our machines at the auto station to be cared for, while we sought out our hotel and spent some little time in removing the Rhode Island real estate from our wearing apparel. After that we did justice to a first class supper. We attended the theatre in the evening, and being pretty tired did not get up until late the next morning. It was our intention to run to Worcester to visit some relatives who lived there. The ladies wanted to do a little shopping before we started, so we left them and went over to see if the machines were in readiness for a start right after dinner. They had been washed and the tanks filled. We made a few slight adjustments and I tried to start my engine, but there was

NO COMPRESSION.

The engine turned over very easily, but of course would not start. We looked everything over carefully for the cause, but could find nothing, and finally called on an expert connected with the place, who, after trying to locate the trouble and failing to do so, suggested towing the machine up to their repair shop, where they had better facilities for locating the trouble. I didn't like the idea of being towed, for it was the first time, but it seemed to be the only way, so my companion backed his machine up and soon had me "on a rope," headed for the auto hospital. The auto specialist soon began his examination, and, although he examined every part carefully, failed to find a leak after a couple of hours' work. He tried to start, but without success. He was then called to look at another case, and during his absence I put on the crank and gave a few vigorous turns, when lo! the engine gave a few harsh coughs and a few puffs of dense black smoke out of the muffler and started off, and ran as well as I had ever seen it.

DIRT ON EXHAUST VALVE THE CAUSE.

When the expert returned he was much surprised to see the engine running, and finally concluded that the trouble was due to pieces of the scale from the inside of the cylinder having fallen and become wedged against the exhaust valve seat in such a way as to hold the valve slightly open, thus allowing a leakage by the valve.

We were considerably relieved to have everything in working order once more, but had been delayed so long by the mishap that we decided to abandon the trip to Worcester and take a run out into the country instead, returning for supper. Everything worked perfectly, and although it was with some misgivings that I stopped the engine on the road, to allow a timid horse to pass, it started on the first turn of the crank.

We started for home about 10 o'clock the next morning, and made the run to Boston in three hours, and after a good dinner started for Lawrence.

Everything went along nicely, until we reached Medford, when in crossing some car tracks, where the paving was wet and slippery, my friend's

MACHINE SKIDDED

and turned completely around, and headed in the opposite direction. One of the rear wheels came in contact with the curbing and was badly wrecked. Fortunately we were near a carriage repair shop, where we got assistance, and left the machine until repairs were made. My wife and I completed our journey without a mishap, and outside of the trouble we had in Providence our carriage had run the 150 miles without any adjustment or without missing an explosion, which is about as good a showing as some of the more modern cars are able to make at the present time.

I had begun to think my old carriage was not so bad after all, and on July 4 with my wife and child aboard and my friend and his wife in their carriage, started for York to make arrangements for spending our vacation there.

We left about 8:30 and expected to be there for dinner, and so did not provide any lunch. If we could have looked into

the future and seen the large bunches of trouble that were stored up for our benefit we would have remained at home with our fireworks and made our vacation arrangements by telegraph, but we could not read the future, and so we went by auto, or at least we went part way.

We had gone a few miles beyond Newburyport when I heard

A PECULIAR HISSING SOUND

that resembled escaping steam, and noticed that my engine seemed to be losing power, and in a few moments it stopped. I got out and tried to start it, but had no compression. I expected to find the trouble with the exhaust valve, the same as our last experience, but it proved to be in the igniter. The mica bushings and washers used for insulating the moving contact on the igniter from the rest of the device were ground into small fragments and blown in every direction. I had no spare igniter and no mica to reinsulate the old one, and while debating in my own mind as to just how I was to get out of my dilemma, I discovered that one of my rear tires had a good sized spike neatly tucked in out of the wet, and that the air which I labored so hard to compress within the tire that morning was fast mingling with the sea breezes from Salisbury Beach.

TROUBLES IN BUNCHES.

It began to look as though we would be late for dinner, but I was not discouraged and started on the tire, and in about twenty minutes had a temporary repair made. In trying to pump it up with the pump that I usually carried I found that it had been dented from rough handling so that it was practically useless. Just at this juncture a friend from home came along in a steam carriage and loaned me his pump, which soon enabled us to fill the tire to its required pressure. I next started on the igniter, and by saving what few pieces of mica there were left, and using some sheet asbestos that I had in my tool box, after an hour's work in the hot sun over an engine that was still hotter, I got things together, and we were soon under way again, about two hours late.

The temporary washers lasted for about 15 miles. Then I heard the same hissing noise, accompanied by a slowing down of the carriage. We were going up a small hill at the time, and were about half way up when the engine stopped. I allowed the carriage to back down the hill and to one side under a large shady tree, and when I got out to look at the igniter discovered that one of my rear wheels was about 6 inches farther away from the carriage than it should be. An investigation revealed the cheerful fact that the set screw that held the axle into the bevel gear that formed a part of the differential had stripped the thread in the gear hub and let the axle work out. I had a spare set screw, but it would not hold, for the thread in the gear had been completely destroyed.

We were then 22 miles from our destination and our dinner looked a long way off.

We were near a farm house and purchased a large can of milk and sat down in the shade to quench our thirst and discuss the situation. I felt more like cussing it. As it was getting late in the afternoon, we decided to abandon the disabled auto and send the ladies the rest of the way by train. We towed the machine into the farm barn and my friend and I finished the trip in his machine, arriving there six hours later than we had planned. Truly, automobiling is sport, but a mighty uncertain kind. We were tired and hungry when we reached our destination and thoroughly discouraged at the way the trip had ended, but a good supper and a good night's sleep renewed our courage. I hunted up a plumber who also kept a stove store, and got a few pieces of mica, with which I

REINSULATED THE DEFECTIVE SPARKING DEVICE

which I had brought along with me. We then started for where we had left my carriage and made the run of 22 miles in one hour and five minutes.

We pumped up the tire, put in the igniter and started for home with one rear wheel held in by faith and a set screw that was devoid of threads.

By careful manipulation we were able to get to Haverhill, where the wheel came out so far that the shaft came out of the bevel gear in the differential, and then the engine raced madly, but the carriage failed to move.

Fortunately we were near an engine house, and one of the firemen loaned us a jack, and we soon had our wheel in place and were on our way again.

We got along all right until we reached a place about 4 miles from home, where a section of the road was being repaired. About 10 inches of loose gravel had been put on the road to build it up, and the only way to avoid it was to run in the car tracks. We had got almost through when we met a car and had to turn out into the soft roadbed. The strain on the loose wheel was too much, and it was soon out of gear and we were stalled again.

THE BEVEL GEAR JOINT IMPROVED.

We had no jack available this time, and had to use a fence rail for a lever to raise the axle enough to get the wheel in place, but the key in the shaft had been twisted out of shape and would not hold, so we pushed the carriage into a nearby shed and left it. A machinist took out the wheels the next day and fitted new keys, and in place of the set screws put taper pins through the gear hub and axle with a nut and cotter pin to hold them, and they have caused me no further trouble.

EARLY MACHINE STILL SERVICEABLE.

I ran my carriage the rest of the season with very little trouble, and have made nearly 800 miles this season with no trouble, except two punctures, both of which I repaired on the road. I find that my old machine has more power this season than ever before.

TOURING IN AMERICA.

I.—America as a Touring Ground—General Hints.

By C. H. Gillette.

Touring is one of the oldest forms of recreation and education. Every method of natural and mechanical locomotion has been employed in traveling from point to point in the pursuit of pleasure and information. From prehistoric pedestrianism to twentieth century automobiling is a long cry and is marked by the ever advancing use of horses, coaches, sailing craft, and the steamboat, the railroad, the trolley and the bicycle. From twentieth century automobiling to pedestrianism is but a short step, as many know to their sorrow.

The nearer a tourist comes to nature, the more benefit he gets from touring, and this is doubtless one of the chief charms of touring by automobile. Walking, bicycling and driving have the same advantage, except for physical exertion and the length of time required. The automobile for use in touring combines all the ideal advantages of these methods of traveling without their disadvantages. These advantages have been recognized more generally abroad and on account of the superior conditions, such as quality of roads, etc., have been made to play a much greater part in leisure life than in this country.

There has been, however, a surprising growth of touring in America, which can be accounted for in part by the increase in the efficiency of machines and the constant improvement in the roads and other facilities for convenient touring, together with the increasing spread of information regarding them.

Our country offers unlimited variety in scenery and natural beauty. We are just awakening to a realization of the fact that it is equal in interest as a touring ground to any of the European countries. It is perfectly natural that thus far touring here should have been confined to a few beaten highways. Many who believe that they have really toured in this country have confined their trips to thoroughfares between New York and Buffalo, New York and Philadelphia, Chicago and New York, etc., and are probably unaware of the possibility of taking side trips, which offer much more scenic beauty than do the more popular routes. A fear regarding the impassability of roads has doubtless detained many from making such trips, but as both roads and automobiles are steadily improving, such objections are being overcome more and more as time goes on.

At the present there are very few trips in the East which cannot comfortably be made by the automobile. The same conditions hold good in the West, except that weather conditions must be taken

more into consideration. In dry weather many of the Western roads are suitable for automobile use, but in wet weather they are absolutely impassable. The Middle West, of course, does not offer the same variety of scenery as the Atlantic coast or the far West.

In the far West, with the exception of the Pacific coast, the objection is not so much in the matter of roads as in facilities for supplies. For the present, at least, the East and Southeast must be considered the most available touring grounds, and, although it is the intention to describe in this series of articles some Western routes, they will be confined more or less to the thoroughfares in the thickly settled portions of the United States.

The question of grades is no longer a hard one to deal with. Hill climbing machines are so plentiful now that he who sets out upon his travels need not hesitate to lay out his trip over mountains and through valleys as well as across the level stretches. The doggedness with which the touring car tackles a heavy grade will quite reassure the tourist after his first experiences, not to speak of the supreme gratification of passing the horse drawn vehicle laboriously crawling toward the summit.

A popular delusion is that the touring traveler must use a heavy touring car of the class so labeled. This fallacy is now becoming quite liberally honored in the breach. The lighter vehicles of the steam or gasoline variety are able to serve the purpose of the occasional tourist today as well as the high horse power car. The main objection, and, it appears, the only valid one, seems to be that the runabouts and single seat vehicles have not the proper "stowing" qualifications. That is to say, baggage cannot be transported to the extent necessary for the tourist's comfort. Confronted by this obstacle, the touring automobilist is apt to jump to the conclusion that it is insurmountable. But the transportation of baggage is not such a serious question, after all. The pursuit of pleasure along the little traveled roads does not presuppose that one must cut himself off entirely from railway towns. The question is purely an academic one if the prospective tourist will give it his attention before he starts rather than when he is starting. It is a singular fact that the man who contemplates a rail or water vacation trip will take three or four weeks to consider every phase of the subject. He will surround himself with the time tables and maps and data concerning his outing, and will figure the minutest detail. Nine times out of ten he will neglect these preliminary precautions when an automobile trip is intended. He will leap joyously into his car with the sublime hope that the time schedule, the baggage question, the route dilemma, the supply hypothesis, the repair trouble, will, according to some occult formula, adjust themselves automatically to his hopes and objective. Often he knows little more than that he is going east or west or north or south to a certain town. Automobile tourists must learn to figure closely on itinerary, station, location, distances, grades, conditions, hotels and the thousand and one details of their trips before they start. This done and the plans closely followed, the real enjoyment of touring is assured. One escapes the routine worries and can turn to the real pleasures of the sport.

The attention to these details is not as difficult as it might at first appear. Information is readily obtainable, not only in regard to roads and routes, but also about stations and hotel facilities. For the real tourist the question of time is practically eliminated, and the arrangement of the schedule is made mainly with reference to night stops.

It is essential that overnight stops be made at towns which afford facilities for the care of the car as well as conveniences for personal comfort. It should not be expected that the car will take care of itself. A railroad company provides a shop and skilled mechanics at every terminal, and after each run the locomotive is submitted to the most careful inspection and repair. This same care should be given to a machine after every day's run, and it is important that the proper facilities should be at hand in case any repairs or adjustments are necessary.

No shop mechanic knows a locomotive in the same intimate way the engineer does, and no repair man can possibly know a strange car as well as its owner or chauffeur. It follows that the closest personal inspection should be given at night before turning it over to the garage for attention and in the morning before starting.

It is only by this personal direction to the care of the car that satisfactory service can be obtained from the repair stations. Throughout the East and in many points in the West the stations are splendidly equipped and in charge of perfectly competent mechanics who understand automobile construction and repair. These men, however, should not be expected to know the individuality of every car nor to be able to give it proper attention in a limited time without instruction from the operator who knows its every peculiarity.

Routes can easily be laid out so that advantageous night stops can be made every 50 to 100 miles. The less distance covered each day the better for man and car. There will always be those whose idea of touring is to make the greatest possible distance in the shortest possible time. These are the selfish ones who incite unjust legislation.

The real tourist—the one who gets the most enjoyment and education from the sport—is he who is satisfied to make from 60 to 80 miles a day, to travel slowly, speeding only on the level, deserted roads, and stopping often to study some bit of nature or to take a photograph of an attractive scene. The annihilation of time and distance is not his object, although he gets real satisfaction from the ability of his car to cover long distances and make fast time. The most satisfactory way to tour is to select some objective point and plan to reach it—not by the most direct route, but by the way which will give the most variety and natural beauty. Trips can be planned to go through or to some certain section of the country by way of points of interest and in a country possessing scenic or other attractions.

It is the purpose of this series of articles to take up various interesting localities and describe tours through them. Many of the routes will be short trips away from the regular routes. It will be ground which has been personally covered, and if a description of these trips leads others to travel them with the same measure of enjoyment and education, the object of the writer will be wholly attained.

Repair of Cracked Water Jackets.

In the course of a paper recently read before the French Society of Civil Engineers M. Jules Garnier described a method by which he repaired the jacket of his automobile cylinder, the water in which froze and cracked the outside casing. The author states that he has cemented wide cracks with a composition of sulphur, iron filings and salammoniac, but in the present case the crack was not open enough to allow the introduction of anything but a liquid, which led to the idea of utilizing the property which the copper salts have of depositing metallic copper when in contact with metallic iron. The cylinder jacket had two openings for the circulation of the water. The cylinders being placed vertically over a zinc basin, the lower opening was closed by a cork and the jacket filled with a slightly concentrated solution of sulphate of copper, through the upper opening. The solution leaked out rapidly through the cracks, collecting in the basin, from whence it was poured back into the jacket. The leakage was rapidly reduced to a mere sweating, so that it was sufficient to pour it back every hour. At the end of the day air was pumped back into the jacket, giving considerable pressure on the liquid. This slightly increased the sweating, but as the extruded liquid was nearly colorless instead of being blue, it was obvious that the operation was nearly complete, and on the next day the cracks were perfectly tight and the cylinders were mounted and used. —*Mechanical Engineer.*

Technical Convention of the A. L. A. M.

A plan is on foot to hold a convention at Buffalo, early in August, of the engineers and experts of the various concerns comprised in the Association of Licensed Automobile Manufacturers. The matter has already been the subject of consi[illegible]ble correspondence, and, though no [illegible] has been arranged, is gener[illegible] The mechanical developm[illegible] try is to be the main [illegible] which will probably [illegible]

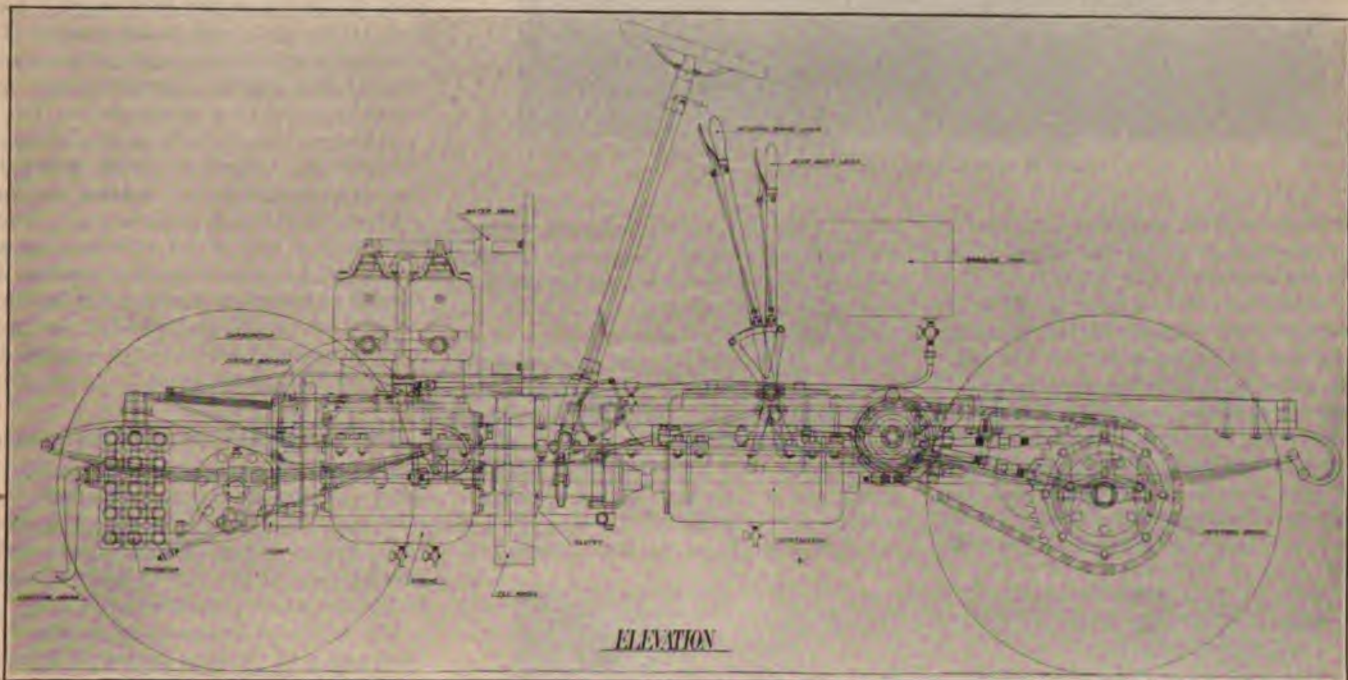
NEW VEHICLES AND PARTS.

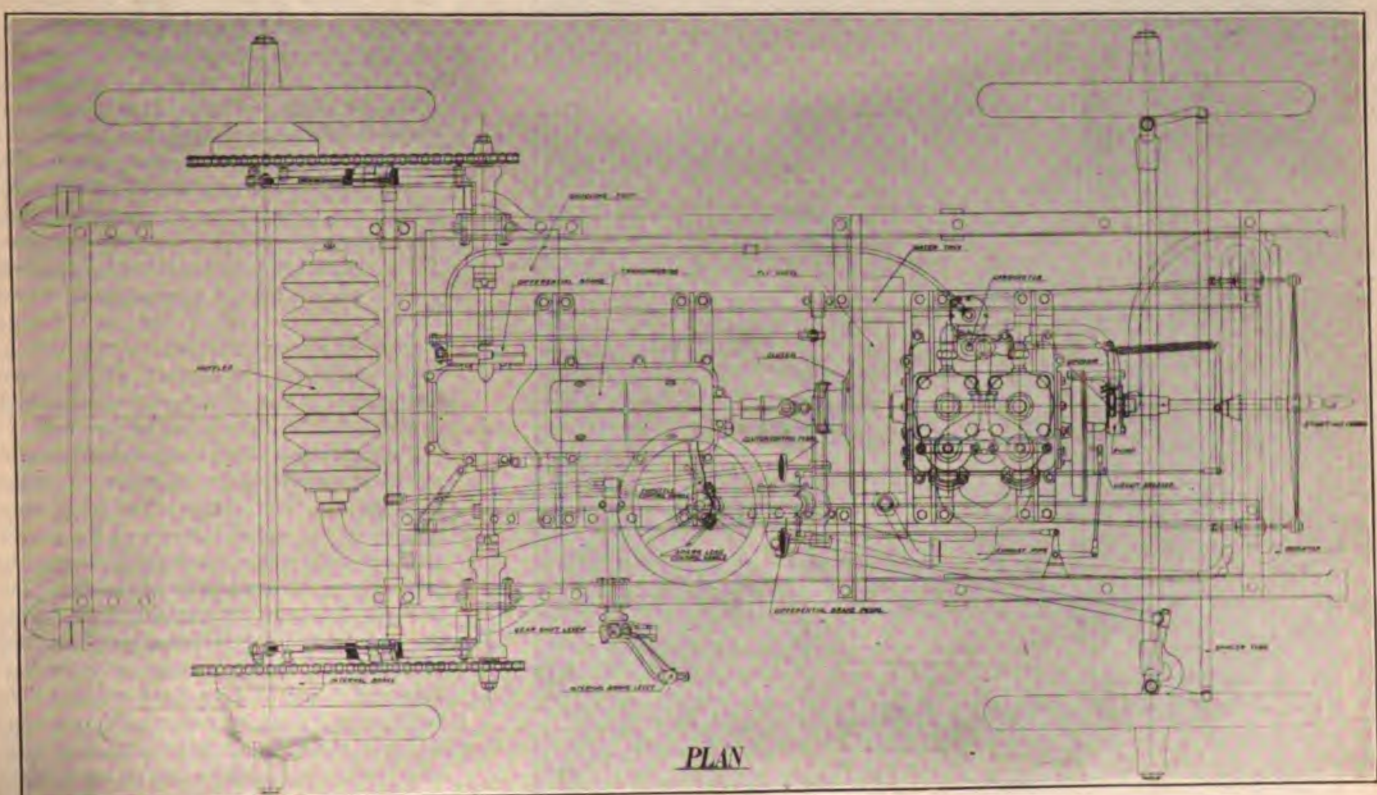
The "Reber" Touring Car.

The gasoline touring car of the Reber Manufacturing Company, now the Acme Motor Car Company, Reading, Pa., was described briefly in these columns when it first appeared on the market. Further details have been received, which we present with illustrations of the chassis.

The vehicle belongs to the medium weight class (1,650 pounds) and is built on French lines. The wheel base is 6 feet 6 inches and the tread 4 feet 6 inches. All the wheels are of the artillery pattern and run on ball bearings. The wheels are shod with "G and J" clincher tires of 32 inches outside diameter and of a cross sectional diameter of 3 inches. Fourteen spokes have been adopted as the standard. The front axle is of seamless steel tubing and the rear is a solid steel forging. The main frame has armored wood sills and steel crosspieces, two of which are of angle section. All the springs are of the semi-elliptic type, and forged steel brackets are employed.

The engine, which is located under the hood in front, has two vertical individual cylinders bolted down to a crank case of aluminoid. The bore is 4 inches and the piston stroke 5 inches. At a moderate rate of speed, it is said, that the motor will develop 12 horse power. The cooling system comprises a water tank of copper which holds 6 gallons, a circulating pump (friction driven off the flywheel) and a radiator with fifteen rows of flanged tubing. Automatic inlet valves and a single vaporizer are used. The centrifugal governor on the forward part of the engine shaft acts on the





THE REBER TOURING CAR.

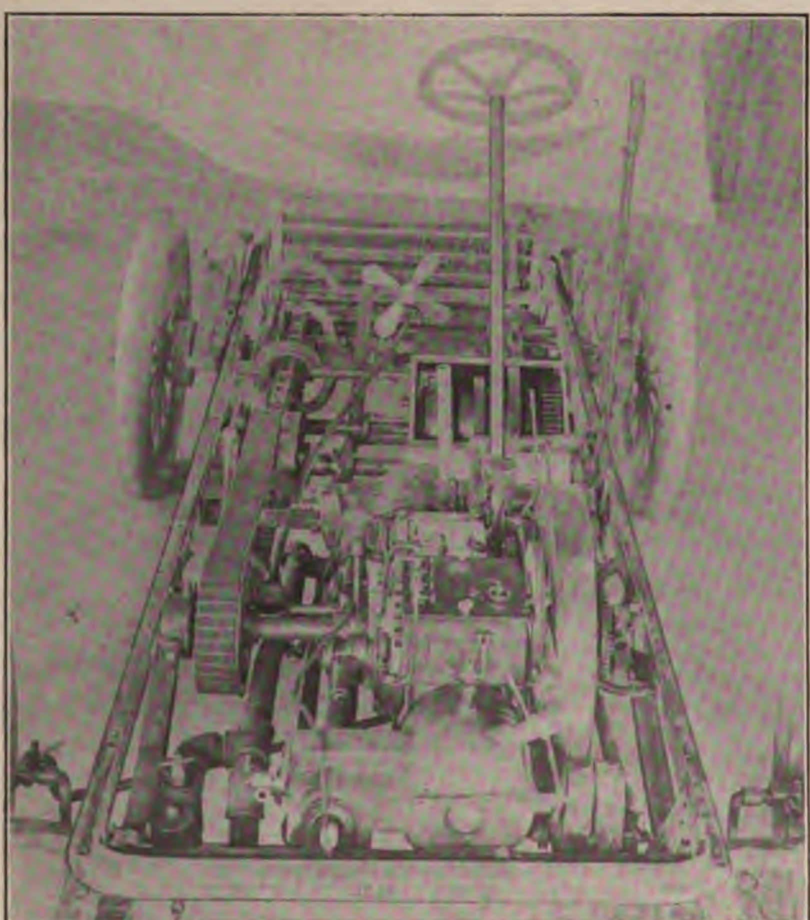
New Haynes-Apperson Tonneau.

rottle valve of the vaporizer and controls e engine speed within the range of 200 d 1,000 revolutions per minute.

By means of a thumb lever on the steerg column the tension of the governor ring can be adjusted so that the govnor will control at any desired speed.

Ignition is by the jump spark system and y batteries, the latter being placed next the gasoline tank under the front seat. wo sets of cells are provided and two ils with vibrators. The switch, of the ug type, may be withdrawn from its socket when the operator leaves the machine, thus rendering the motor inoperative. All the wires are heavily insulated to prevent short circuiting.

The flywheel is bored out for the clutch, which is of the conical type. Between the clutch and the gear box is placed a universal joint of novel design which prevents binding. The change speed gear is of the sliding type and provides three forward speeds and a reverse. All the speeds are controlled by a single hand lever, which is equipped with a spring latch, as shown.



Haynes-Apperson Chassis.

The case of the balance gear is cast integral with the case of the variable speed gear. Like the engine, the gear box is bolted to a false frame of angle iron. Side chain drive to the rear wheels is employed. The sprocket shafts revolve in ball bearings, and universal joints are interposed between them and the master gears of the differential.

Steering is done by means of a hand wheel, which is mounted on an inclined pillar. For the sake of reducing motion a worm and sector are fitted; there are also a clutch pedal and a brake pedal which applies the brake on the balance gear drum and relieves the clutch automatically. The emergency or hub brakes are of the double internal shoe pattern, and are brought into action by means of a hand lever.

Three models are built by this company —Model A, a tonneau (with detachable rear seats); model B, a touring car with platform in the rear, and model C, a machine with a boot in the rear for luggage.

The builders claim that their vehicles are capable of ascending a grade of 25 per cent. on the low gear, and that the fuel tank holds sufficient gasoline for a run of 150 miles on fairly good roads.

The Haynes-Apperson Tonneau.

The new Haynes-Apperson tonneau, of which we presented an illustration some time ago, showing it with testing body in place, has now been fully completed, and a general view of the car, as well as a plan of the chassis, is shown herewith.

The motor in this machine is placed in front and is of the same general design and construction as that heretofore employed, but of higher power without material increase in weight. On the shaft of the motor is a sprocket wheel which is connected by means of a silent chain to a sprocket of about the same size placed on a countershaft, crossing the chassis just behind the rear cylinder of the engine. Upon this countershaft are arranged the gear wheels giving the three forward speeds, and the small sprocket wheel giving the reverse. These gear wheels mesh with corresponding wheels on the regular countershaft, which carries the clutches of the well known Haynes-Apperson construction. On the opposite end of the countershaft which carries the clutches is a small sprocket wheel, which is connected by a chain to the rear axle.

The outer end of the engine shaft, as well as front countershaft, revolves in roller bearings; in fact, the entire mechanism, outside of the main bearings of the motor, is fitted with roller bearings, including the rear axle and front wheels of the car. The radiator is placed in the rear just behind the rear axle, and is constructed entirely of aluminum, having a large radiating surface and being of very light weight. The radiator is cooled by means of a small fan which is rotated by means of a small friction wheel revolving against a disk on the forward countershaft, through the intermediary of a flexible shaft. This plan of construction

leaves the motor entirely unencumbered and gives the utmost freedom to the operator in making any small adjustment which may be necessary. All adjustments on the forward cylinder may be attended to by raising the hood and standing at the front end of the car. There is no radiator in the way and hence no discomfort will be felt on a hot day, due to its proximity to the motor in case adjustments become necessary. Another reason for placing the radiator in the rear of the carriage is its comparative freedom from liability to injury by collision or other accidents.

In the body of the car particular attention is said to have been given to artistic and harmonious lines throughout. The tonneau or rear portion will seat three grown persons and two children, or in emergency five grown people may be carried, while the front seats will carry two additional persons, making seven in all. Full elliptic springs are used in the rear, and long semi-elliptic in front.

The machine is fitted with a drum brake on the differential and an emergency brake on both rear wheels. Placing the foot on the brake when the car is in motion disengages the clutch and stops the car.

Kells Honeycomb Radiator.

W. J. Kells, of Jersey City, has recently placed on the market a honeycomb radiator, similar in type to those so successfully used in the industry abroad. Several styles of these radiators are to be made, designed for engines of from 16 to 60 horse power. The construction employed involves the use of from 1,500 to 3,100 small copper tubes, 5¼ inches long, soldered between sheet copper heads, thus giving a large cooling surface with low weight and small water content. The surface exposed to the air ranges from 50 to 85 square feet in the different styles. Several prominent manufacturers have adopted them.

In connection with the experiments through which Mr. Kells developed his present form of cooler, it is interesting to note that over a year ago he used the square tube with expanded ends, such as has lately been adopted by the Mercedes people.

A Few Imported Novelties.

Charles E. Miller, 97 and 99 Reade street, New York, has recently imported the following novelties from France:

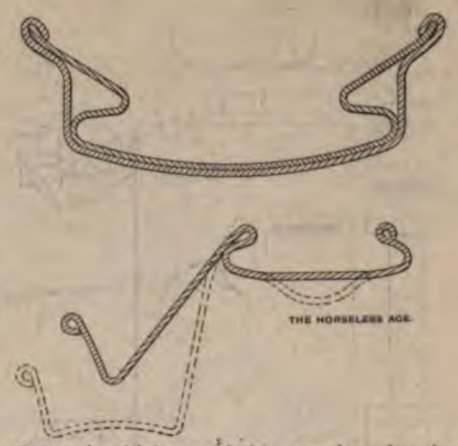
A small nickel plated voltmeter mounted on a mahogany base intended to be secured to the dashboard. The instrument is equipped with three binding posts and two press buttons, so that the voltage of two sets of batteries can be determined. Another voltmeter of similar construction is intended for reading the voltage of but one battery. When changing over to the other battery the wires of that battery must be connected up to the meter before readings can be made. This voltmeter is adapted to cars in which but one battery and a generator are employed.

A spark gap device called "le disrupteur," which is intended for four cylinder motors, was also shown. Each spark takes place in a glass tube enclosing the sparking terminals. The whole device is placed in a case of black walnut with a glass front.

The French have of late produced a great variety of eye and face shields, as well as goggles. Some of them are designed for use in all kinds of weather, while others are intended for particular weather conditions. One of the latest importations has a silk mask with a fringe of chenille and a glass plate which can be readily removed whenever cleaning becomes necessary. Another pair of goggles for use in rainy weather has a rubber mask which protects the entire face and neck. The frames to which the glass or mica is secured are now made of aluminum exclusively.

Post Electrically Welded Wheel Rims and Drawn Metal Goods

The firm of Eugen Jul. Post, of Cologne-Ehrenfeld, Germany, is entering the American market with a line of drawn steel wheel rims, wheel fenders and similar articles for motor cycles and automobiles. The wheel rims are electrically welded, and possess, therefore, the advantages which this process insures over brazing. Two of the more original designs are illustrated herewith. The upper sketch in the cut represents a rim for special make of automobile tire. It is made of two separate pieces



of metal which are held together by the flanges of the outer piece being turned over the edges of the inner piece. The lower drawing is a section of a rim for a motor cycle wheel with which a driving pulley is formed integral. The advantage of having rim and pulley thus made in one piece need hardly be emphasized, as they can by no possibility get out of true. The dotted lines in this drawing are to indicate that the rims and pulleys are made of different sections to accommodate different forms of tires and belts. In this country, for instance, flat belts are generally employed for motor cycles instead of the round belts more common abroad.

The steel fenders are of very thin metal and are consequently light; they are either nickel plated by the galvanic process, or mechanically nickel covered.

The firm is represented in this country by Edward C. Post, of Dundee, Mich.

Some Recent Lunkenheimer Productions.

The Lunkenheimer Company, Cincinnati, Ohio, are manufacturing a number of special magazine lubricators in addition to their regular line of goods.

In Fig. 1 an oil reservoir with header castings, a hand pump and a casting with nine "points," are shown. The whole lubricator is intended to be bolted to the dashboard of a car in full view of the operator. When oil is to be forced into a bearing the pump handle is raised and oil then flows into the pump. The cock im-

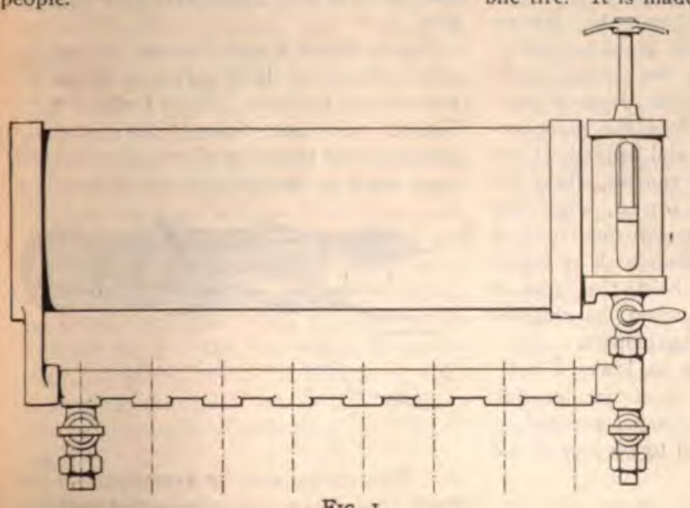


FIG. 1.

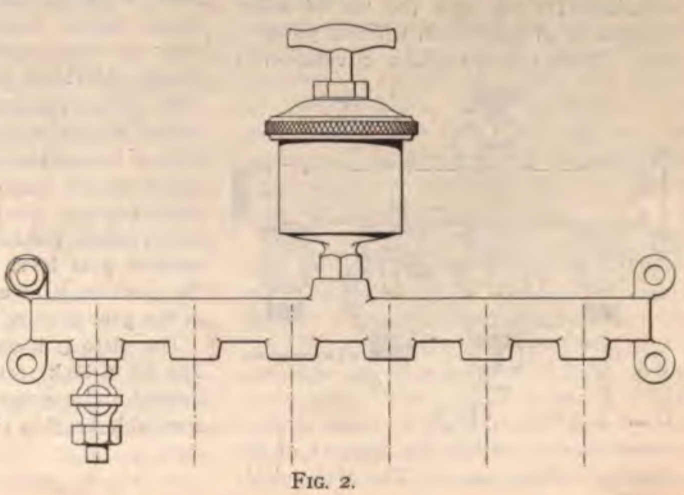


FIG. 2.

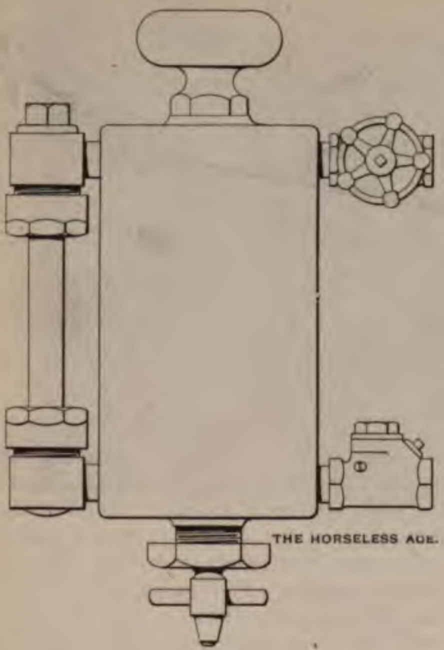


FIG. 3.

mediately below the pump is then opened and the piston is forced down, after the pet cock that controls the flow to the respective bearing has been opened.

Of all the points that communicating with the crank case (provided splash lubrication is employed) is likely to be used most frequently. In this case it is well to connect the tube leading to the case up to the second cock below the pump.

This apparatus may be fitted with as many connections as desired.

Fig. 2 illustrates a multiple feed lubricating apparatus in which grease is used as a lubricant. To a hollow casting with the required number of connections a large grease cup of the company's "Marine" type is secured. The flow to the various tubes is controlled in the same way as described above, by means of pet cocks.

Fig. 3 is an oil reservoir which is equipped with fittings to which tubes run between the multiple sight feed fittings (Fig. 4) and the pipe from which pressure is obtained. A check valve is provided to keep the gas or water that has once entered the reservoir from escaping back into the exhaust or water circulating pipes. The manufacturers advocate the use of water pressure in all systems in which a pump is used. With thermo-siphon circulation it

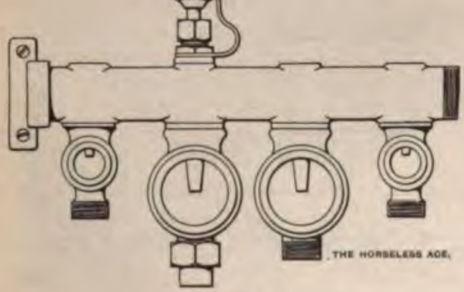


FIG. 4.

is necessary to employ the pressure of the escaping exhaust gases. The reservoir is equipped with a glass to indicate the amount of oil that it contains, and a plug for filling, a cock for draining and a valve for throttling the flow are also fitted.

The multiple sight feed (Fig. 4) is provided with means for adjusting the rate at which each nozzle drips. A number of these fittings were provided with eighteen "points."

The "E. C. C. O. Intensifier."

The Electric Contract Company, 202 and 204 Centre street, New York, are now manufacturing and marketing a condenser which belongs to the secondary wiring of jump spark ignition systems, and is intended for use with a "spark gap" device. The appliance has been termed by the manufacturers an "intensifier," and is built to resist the high potential of the secondary current.

In the presence of a representative of THE HORSELESS AGE a demonstration was made to show that with this device sparking with carbon covered points can be effected. The sparking terminals of a plug were covered with a mixture of carbon and cylinder oil in such a way that they were short circuited. As soon as the circuit was closed a spark appeared, and in a moment the deposit disappeared completely. The spark will perforate a visiting card, although it will not set fire to it, as an ordinary spark will, and is of an intense blue color.

These intensifiers are made for use in connection with motors having from one to eight working cylinders. It is stated that Alexander Winton employs this device in his eight cylinder Gordon Bennett racer.

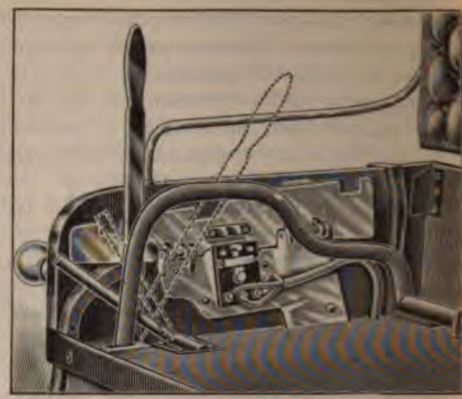
Lock for Oldsmobiles.

This lock is the invention of Dr. B. Dorr Colby, and is designed for locking rigidly the operating levers on an automobile so that it can be left on the street indefinitely without fear of molestation from would be thieves or mischievous small boys.

The lock is designed specially for Oldsmobiles, and consists of a flat plate hinged to the side wall of the body in such a way that it may be thrown down into a horizontal position, bringing one end against the brake lever, should this lever be in its elevated position. The opposite end of the plate impinges the igniter lever and holds it at the limit of its downward movement, where the speed of the engine is lowest, while the outer edge of the plate is formed with a notch, which embraces the clutch or transmission gear lever and holds the same in the position it assumes when the clutches of the gear are out of engagement.

The plate is locked in its lowered position by a lock secured to the under side thereof and engaging a keeper secured to a suitable bracket riveted to the top of the seat.

As will be noted from the cut, the bat-



tery switch may be locked "off" or "on" either set. When locked "on" the clutch lever is locked between low and high speed, and the ignition lever at "retard," so that the motor will run slow. At the same time the emergency brake may be set right and also locked.

Baldwin 1904 Detachable Chain.

In the construction of the new model of Baldwin chain, as shown in Fig. 1 herewith, each pin is riveted at one end and formed for a detachable connection at the other. The detachable and free ends come on opposite sides, so that the pull on the

FIG. 1.

chain is even, whereas, if both riveted ends were on the same side and both free ends on the same side, it might be claimed that the chain would draw unevenly.

The small fixture shown in the cut is a steel tempered spring, the two jaws of which set under the head of the pin, and a small tongue which slips into the hole in the side link in which the pin is inserted, thereby holding the free end of the pin in place in the link. This spring is more accurately shown in Fig. 2. It is said to be impossible for it to work out. There is one of these springs on each side of each link.

Fig. 2 shows a small spring or tool by which the small lock spring may be removed and replaced. These tools are delivered with each chain. They are not necessary for removing the spring, but add very much to the convenience of handling

FIG. 2.

it. The spring can be removed by any small tool, like a jackknife or screwdriver.

COMMUNICATIONS.

Chamois Skin and Muslin for Straining Gasoline.

Editor HORSELESS AGE:

In regard to Henry Van Arsdale's inquiry in your last week's issue as to whether chamois would separate water from gasoline in filling the tanks, I beg to say that, while I have had no experience with chamois, I have had excellent results for the past four years by simply placing a piece of ordinary muslin across the mouth of the funnel when filling, and have found that absolutely no water will go through with the gasoline, as it stays in the bag formed by the muslin and can be thrown out after filling the tank. I have a tank of gasoline buried in the ground from which I pump out what I require, and I frequently have to first pour a little water into my pump in order to make it suck. This water, of course, goes in with the gasoline, and if it was not effectively separated from same would prove disastrous to the running of a gasoline engine, but I have never been able to detect any sign of water in my tank after using the simple method above described. So if muslin will act as well as that, it is beyond doubt that the chamois would be absolutely sure.

C. E. VARIAN.

Spark Advancing Arrangement for Haynes-Apperson Machine.

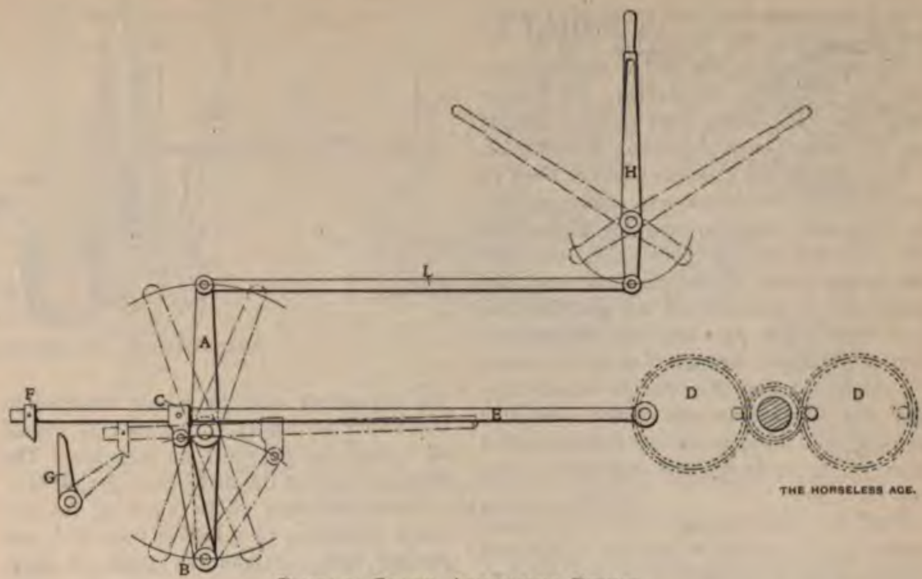
Editor HORSELESS AGE:

I enclose you a rough drawing of my device for advancing the spark on my Haynes-Apperson machine. It is very simple and has only two wearing parts or joints, the same number as the original device.

Referring to the drawing, A is a movable vertical standard pivoted to the side of the combustion chamber by a pin passing through it near its centre. Near the lower end of this standard is fixed to it a pin $\frac{3}{8}$x1$\frac{3}{8}$ inches, screwed and brazed in. Upon this pin is journaled the rocker arm B. The latter has fixed to it at its upper end another journal pin, upon which is journaled the sleeve C.

The igniter rod E from the half speed shaft D passes through this sleeve C and is securely fastened to same. As the igniter rod plays back and forth, the rocker arm moves to the right and left, the bottom being journaled to the upright. On the igniter rod and back of the sleeve C is the contact pin F. This pin comes in contact with the igniter jaw G on the igniter shaft at the time the rocker arm is "plumb" or on the centre with the bearing in the upright A.

When the arm is in this position the upright can be swung either way without



CONTACT SPARK ADVANCING DEVICE.

throwing the rod either up or down, so the contact is always the same. Throwing the bottom of the upright back will cause the end of the igniter rod to be given a dip, thus prolonging the contact and retarding the spark, while throwing it forward will produce the opposite result.

I do not mean by the above that the spark can be changed only when the rocker arm is on the centre, for it can be changed while the arm is in any position, their relation always being the same.

The standard A is connected to the spark lever H through the link L.

J. L.

A New Experience.

Editor HORSELESS AGE:

Last autumn when I had been running a new high powered and expensive steam carriage, especially constructed for me, about a month, my fire began to go out; it was not blown out by the wind while standing, but went out while running with the steam below the shutting down point. This would occur four or five times in the first 5 or 6 miles, when it would cease entirely and not go out again during a whole day's running. After being fired up and while standing in the stable it would very rarely do so, but as soon as started upon the road it would begin to go out. There was no "burning back" or "popping" to it; it would just go out and continue to do so, as related above. This did not happen occasionally, but was a regular occurrence every time I went out. As it had not done so during the first month, and as gasoline and burner seemed all right, I was in a quandary as to what was the matter, and was quite annoyed.

I immediately went to those whom I thought would know about it, and no one had ever heard of such a thing before. I had the fire box removed, the piping overhauled, the vaporizing nozzle examined without relief. I called in in succession four different "experts." Each went over the same ground, but no one of them could give me any explanation or offer me any remedy. The fire box was taken off four times, the piping was overhauled, the mixing tube adjusted and readjusted, and yet no change. No one could explain it, but all agreed there was no trouble with gasoline or burner.

I would say right here that my gasoline came from the dealer who had supplied me for a year with perfect satisfaction, and everyone called into the case remarked upon the splendid strong, blue and steady flame.

I went to all my friends who had used steam carriages, and took them out to ride. While they made various suggestions as to the possible cause, no one helped me to solve the mystery and the annoyance went on.

The selling agent was consulted and could give me no explanation or suggest any remedy, but very kindly offered to have it investigated if I would send the carriage to him. This I resolved to do as a last resort, but as I was very busy and using the carriage every day I put off doing so and worried along until the sudden advent of severely cold weather, when it was put away and not in commission again until the first of March.

At Christmas time a friend gave me a hydrometer for testing gasoline. While having my carriage fitted out again for use on March 1 it occurred to me to test that gasoline. I did this principally as a matter of curiosity and to use my hydrometer, not expecting this to help me in solving the mystery of my fire, as every consultant had been emphatic in expressing the opinion that the trouble was not there.

Much to my surprise I found it tested only 66°. I supposed I had been buying 76°, and immediately began some experiments. I found that straining the gasoline through a chamois skin and strainer, or through two strainers immediately stopped the trouble. Now evidently that had been due to water in the gasoline, and the reason it would cease after a few miles was that the thorough heating of the piping

would evaporate the little bubbles of water before reaching the vaporizing nozzle.

My man had noticed and remarked upon the fact that when the carriage stood some little time after being fired up and did not go out immediately there was less trouble.

Straining of the gasoline through the two strainers did not show any water or dirt in either, but from the fact that it remedied the difficulty at once convinces me that water was there. I can give no other explanation. I now test all my gasoline; accept none below 74°, and take the precaution of putting it through a double strainer.

I might say that this trouble should have and did suggest to our minds defective gasoline, but this was immediately dispelled in every one by finding the unusually strong and clear fire.

This has been a very interesting (and somewhat expensive) experience to me, and new to apparently everyone in this vicinity; perhaps others farther away may have had similar ones. THOMAS KITTREDGE.

How to Prevent Freezing of Steam Gauges.

CHRISTIANIA, June 3.

Editor HORSELESS AGE:

Several times last winter during cold and windy weather the steam gauge of my automobile became frozen and at times was nearly destroyed, the ice deforming the expanding part of the gauge. I had much trouble from this source at first. I found that the most careful packing with felt was useless, and several gauges broke. Undoubtedly the same thing has happened to steam carriage users in your country, and the following description of how I entirely remedied this trouble may therefore be of interest to your readers.

To begin with, I disconnected the pipe leading from the boiler E to the gauge F and by means of two union fittings C inserted a U-shaped pipe, which was nearly filled with mercury (D). Care must be had that the mercury can under no circumstances get into the boiler, as it would injure copper or brass parts. The pipe A leading to the gauge is filled with alcohol

ARRANGEMENT TO PREVENT FREEZING OF STEAM GAUGES.

(or glycerine) and the whole attached to the boiler as before. The part B should of course be as short as possible. The whole device can be made at a cost of $4.

I also enclose a photo showing the two latest American cars I have imported, one for my own use, and the other, an eight passenger car, I sold for conveying travelers. This is the fifth car I have sold this year for conveying travelers, and these steam cars have given excellent results on our very hilly roads. The car shown uses kerosene fuel, which is an essential feature here, as it is impossible to get gasoline in this country, while American kerosene may be bought everywhere. The burners are giving good results, but require more attention than gasoline burners and produce more soot.

The arrow in the half tone shows the location of the U tube containing the mercury. F. HIORTH.

Explosive Engine Queries.

Editor HORSELESS AGE:

There is some discussion among manufacturers here about the proper sizes of inlet valves for high speed engines and the lift of the same.

Will you kindly give your opinion on the size of valve necessary to run a two cylinder vertical engine (5 inches bore and 6 inches stroke) at 1,100 to 1,200 revolutions per minute under brake test, to make same develop its highest horse power? LOUIS C. HOWARD.

[It is customary in high speed engines to make the inlet valve of a clear diameter equal to one-third the cylinder bore, which gives about 1¾ inches for a 5 inch bore. Eleven hundred to 1,200 revolutions per minute is a very high speed for an engine of 6 inches stroke, and we doubt whether it is possible to obtain as much power at these speeds as at a lower speed. For purposes of comparison we will give the dimensions of the 35 horse power Mercedes motor. This is a four cylinder motor of 4¾ inches bore and 6 inches stroke. The speed is said to be variable between 200 and 1,200 revolutions per minute and to be normal at 1,000 revolutions per minute. The inlet valve has a flat head of 2 inches outside diameter, which leaves about 1¾ inches for the clear diameter, and a lift slightly above three-eighths of an inch.

In order to get the greatest possible power at 1,100 to 1,200 revolutions per minute it may be necessary to use an inlet valve of the annular seat type, similar to the Mercedes illustrated in our last issue. To get a full charge into the cylinder at high speed it is necessary that the inlet valve be fully opened as quickly as possible, remain fully open till near the end of the inlet stroke and then close very quickly. This can only be accomplished with a valve of very small lift, and in order that a small lift may still give an effective opening, equal to the cross sectional area of the valve head, the valve must be of the annular seat type. Some other manufacturers, in order to obtain proper valve action at high speed with such comparatively large cylinders as these, use three distinct inlet valves per cylinder.—ED.]


AMERICAN STEAM CARS IN NORWAY.

Spring Suspension

Editor HORSELESS AGE:

Your last issue contained a very good article on "Side Springs," by Hugh D. Meier. It is, in fact, the first article which I have noticed in reference to this subject wherein the shortcomings of springs as they are universally used on automobiles are clearly stated, giving reasons why improvements have not, as yet, been made in this respect.

Too much stress cannot be laid on the importance of perfect parallelism of axles, which is indispensable to smooth running under all conditions of road. The same applies to a fixed relation be-

tween the front axle and the steering organ with ordinary construction. A good deal of lateral jar and consequent vibration is transmitted from the road wheels through the springs onto the steering lever, to be cushioned by human springs.

The importance of these features is evidently not universally appreciated, or else buyers of automobiles would exact a better fulfillment of these requirements.

Springs are provided to intervene as resilient members between the wheels and the carrying body, the load and machinery of the latter. To act as such they must be allowed to expand and compress freely. In common practice they are subjected to thrust and twisting strains, and it is therefore evident that their elasticity is interfered with.

Allow me to draw your readers' attention to United States patent No. 698,493, describing the system of spring suspension which is in use on my trucks.

The axles slide in guides in a vertical plane only. The springs simply load the axles, but have no rigid connection with them. The wheels can therefore assume any inclination without reacting on the springs. This arrangement has been found quite practical under very severe test.

Mr. Henry G. Chatain, who acted as official observer on a steam truck of my design in the recent Commercial Contest, No. 7, remarked to the writer that the truck, though laden with cobble stones, rode throughout the test like a coach.

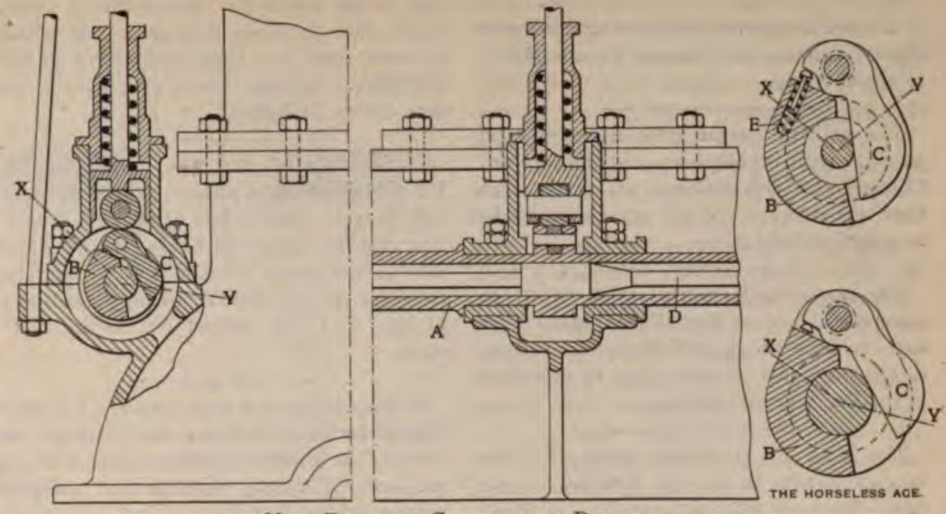
I am convinced that the easy riding qualities of an automobile can only be secured by free springs and parallel axles.

ARTHUR HERSCHMANN, M. E.

FOREIGN.

Glasgow-London Non-Stop Awards.

The report of the committee of the Scottish Automobile Club (western section) on the Glasgow to London non-stop trial which took place on May 13 and 14 has now been issued. The highest possible marks obtainable were 1,000, and this number was obtained by seven cars out of eighteen which finished without being disqualified. The seven were: A 10 horse power Lanchester, with Michelin tires; two four cylinder Sunbeam cars, the one having Collier and the other Clipper Continental tires; an Arrol-Johnston dog cart and a six seated Arrol-Johnston carriage, both with solid Shrewsbury-Chalinor tires; a 10 horse power Wolseley tonneau with Clipper Continental tires; and a 12 horse power Argyll with clincher Michelin tires. Capt. H. H. P. Deasy, who drove himself a Rochet & Schneider with Clipper Continental tires, and a 14 horse power Chenard & Walckers tonneau entered by the Western Motor Syndicate, each obtained 999 marks. Four motor cycles finished, but none of them obtained more than 995 marks, the number awarded to a machine entered by the Quadrant Cycle Company with clincher tires. The report says it is believed that no motor cycle came through without pedaling, but no marks were deducted for that.



NEW PANHARD COMPRESSION RELIEF.

New Panhard Compression Relief.

The new 80 horse power Panhard motors are provided with a novel device for relieving the compression in starting, which is illustrated herewith. The device consists of a cam with a hinged section, which may be forced outward from the centre of the cam by means of a rod with a tapered or spindle shaped part passing through the hollow cam shaft. Referring to the illustration, A is the hollow cam shaft mounted in bearings in the cam shaft housing. This housing is in two halves, the lower half being cast integral with the crank shaft and the upper half bolted to the lower half. The cam B is cut with a deep slot at the middle of its length, and in this slot is located the pivoted part C, the pivot pin passing through the raised portion of the cam. Through the hollow cam shaft passes a rod D with sections of different diameter and with a tapered portion. The pivoted part C bears against the rod, owing to the pressure of a spring E. When the pivoted part is entirely below the surface of the cam the valve is lifted for about one-quarter the revolution of the cam, as shown by the lines X Y in the upper sectional view. When the pivoted portion is forced outward the valve is opened for a longer period, as indicated by the lower sectional view of the cam. The rod D extends the entire length of the cam shaft, has four sections of increased diameter and operates all four inlet cams simultaneously. Before the engine crank is turned for starting the engine the rod D is forced into the hollow shaft to force the pivoted sections C of the cam out, and thereby cause the inlet valves to remain open for part of the compression stroke. When the engine has been started the rod is drawn back to its original position.

Edward Nichols, an automobile driver, was sentenced to a month's imprisonment by Justice Garrett, of the Southwestern Police Court, London, a fortnight ago, for having been intoxicated while in charge of an automobile and having smashed up a hansom cab.

The Royal Automobile Club of Portugal has just chosen its committee. The president will be the King of Portugal; vice president of honor, Prince Dom Luiz Filippe; perpetual president, Dom Alphonso; vice presidents, Jacquitto Parreira and Zeferino Candido; secretaries, Jeronimo Montéro and Joas Cravero Lopes d'Oliveira.

There have been a number of changes recently in firms representing American cars in England. The Locomobile Company of Great Britain has taken the exclusive agency for the Oldsmobile, and Mr. Lotts, who was formerly at the head of the Locomobile Company, has resigned that position and associated himself with Charles Jarrott.

The following communication appeared in a recent issue of *La Locomotion:* "I am quite certain all reasonable men will agree with me that it is against our interests for the Gordon Bennett Cup to be held, as the results of the Paris-Bordeaux Race show that we have every chance of being beaten, taking into consideration that of our three champions (Fournier, De Knyff and H. Farman) not one succeeded in reaching Bordeaux. It would be a hundred times better for our important export trade in automobiles that the cup should remain in England without a blow being struck to win it rather than that it should escape from us in a recognized race. A defeat would be disastrous to the reputation of the French motor trade in foreign countries, and it seems that this is what will happen. Let us then wish most earnestly that the Gordon Bennett Cup Race will be prohibited by the English authorities."

At the meeting of the Automobile Club of France on June 3 Honoré Palmer and Potter Palmer, of Chicago, were admitted to membership.

The policing of the Irish racecourse on July 2 will involve an expenditure of $3,500. The Government has declined to bear this expense and the organizers of the race will assume it.

The automobile fêtes which were to have been held at Paris from June 18 to 20 have been indefinitely postponed owing to the accidents to a number of members in the Paris-Bordeaux Race.

The Rev. E. D. Shaw, vicar of High Wycombe, and the Rev. R. Oakley, his curate, were each fined £2 and costs at Wokingham (Berks, England,) police court, on June 2, for riding motor cycles at a greater speed than 12 miles an hour.

The question of establishing a "motor drome" or special automobile track is also rife in Belgium, and the A. C. of Belgium has addressed a proposal to the municipal council of Spa looking to the use of the old Roman road in the vicinity of Spa for such purposes.

In consequence of the fatalities in the Paris-Madrid race the Austrian Automobile Club has decided to urge the authorities to restrict racing. It is more than likely that the contest for the Poetting Cup will be abandoned, as also the proposed international race.

According to the official police statistics in the six years 1896 to 1901 the average number of persons killed annually in London was 70 by vans, 43 by carts, wagons and drays, 19 by cabs, 17 by omnibuses, 6 by private carriages, 4 by cycles and only 1 by light locomotives (automobiles).

The Bishop of Cahors leaving his cathedral on a recent Sunday met one of the Paris-Madrid racing cars. He expressed great interest in the race and bestowed his benediction on the car, its driver and machinist. History does not relate whether this car was among the arrivals at Bordeaux.

It is illegal in Belgium to disguise oneself at any time other than that of the carnival, or even to appear in public in fantastic or fancy dress. An exception is henceforth to be made of automobilists, however, provided their "disguises" are such as are "indispensable to those who circulate in automobiles."

On June 19 the A. C. G. B. I. held a gymkhana at the Ranelagh Club, Barnes. The first event was a bending race, in and out between staves. The second a "coach house" contest, the competitor having to manœuvre his car out of an awkward position in an enclosure representing a coach house, race 50 yards through a gate which he must open and shut, and return to the enclosure. Another event was a race for cars driven by ladies.

It is reported that the failure of the Paris-Madrid Race almost proved fatal to the Royal Automobile Club of Spain. The club had incurred heavy expenses and was at the verge of bankruptcy, but the financial aid of several wealthy members of the A. C. F. helped it "on its feet" again.

While driving at a high speed in his automobile between Brussels and Ostend on June 1, the Prince of Monaco met with an accident. The car skidded and collided with a bridge near Deyrze and the prince, the driver, and a lady were thrown violently out of the car, receiving a severe shaking and some bruises. The prince continued the journey to Brussels by train.

On June 1 a regular service of automobiles was started between Potchefstroom and Mafeking, South Africa, and another route between Krugersdorp, Rustenburg and Zeerust has already been arranged. Motorists of Johannesburg are agitating for the road between the Rand and the capital to be put in order. There are two "sluits" on the road which render the journey dangerous.

"In the races last year in France," says Charles Jarrott, "in the Circuit du Nord, the Paris-Vienna, and the Circuit des Ardennes, a number of cars were smashed, and whether it was luck or good judgment on the part of the drivers I know not, but anyhow no one was killed. Yet a large numbers of these accidents contained all the elements of a tragedy with the tragedy left out."

An Irish magnate has pointed out to the organizers of the Gordon Bennett Cup contest that the town of Carlow will suffer great inconvenience on the day of the race. From 6 o'clock in the morning until evening no doctor can attend a patient in the district, no clergyman can visit the sick, no postman can deliver a letter or a telegram, nor can any resident communicate outwards, by post or otherwise, because traffic is prohibited on the only roads of access.

Arrangements are said to be in progress by the British colonial authorities for the purchase of 100 or more motor vehicles for shipment to the Transvaal and the Orange River Colony. These are to be employed for mail purposes, pending the completion of the various new lines of railway, and are to be attached to stations on the main line, whence they will take the mails and other postal matter daily over districts which are now being mapped out for new lines.

An international automobile race from Moscow to St. Petersburg, a distance of 430 miles, is announced to take place early in August. There will be seven intermediate control stations. So far the entries include five high power machines, ten of them from 6 to 12 horse power, six smaller ones and twelve motor bicycles.

An "Open Bridge" Accident.

While on an automobile trip to Indianapolis, to attend a meeting of the Association of Railroad Surgeons, Drs. F. F. Tuttle and R. I. Morgan, of Van Wert, Ohio, were seriously injured by their machine running into an open bridge near Marion, Ind., at 10 p. m. on June 17. The machine fell about 15 feet and struck a stone arch at the bottom of the excavation. The injured men lay at the place for several hours until help came, when they were taken to the Marion Hospital. Dr. Morgan suffered a fracture of the left thigh and fractures of the kneecap, and his right leg was broken at the ankle. Dr. Tuttle was less seriously hurt, although he landed on his head and was found in a semi-conscious condition.

The county commissioners and the contractors are censured for not displaying danger signals at night to warn people who might be driving along the road. A pile of sand had been dumped in the road about 30 feet east of the excavation and a board had been laid on top of two stakes at the brink of the excavation. The automobile plunged through the sand and the road and carried the board down with it. The bridge at which the accident happened is at the foot of a hill. The machine was going at full speed when it turned into the opening. The injured men allege that no lights were out, and that there was no obstruction of any kind to warn them of danger. Dr. W. N. Fowler, of Bluffton, Ind., vouches for the correctness of the above report.

If negligence of either the commissioners or of the contractor is shown we hope that adequate punishment will be meted out to the guilty parties, as the safeguarding of the roads is a very important matter.

Trade Literature Received.

Buckeye Motor Company, of Columbus, Ohio.—Circular of the Buckeye sliding gear transmission, which gives two speeds forward and a reverse, and direct drive on the high gear.

Acme Motor Car Company, Reading, Pa.—Catalogue of the Reber motor car.

Michigan Automobile Company, Limited, Kalamazoo, Mich.—Catalogue of the "Michigan" automobile.

Michelin & Cie., Clermont-Ferrand (Puy-de Dome), France.—Fourth edition of the Guide Michelin.

K. L. Ryman Company, Lawyers' Building, Newark, N. J.—Catalogue of automobile drop forgings made by the Strieby & Foote Company, of Newark.

Maintenance and Repairs.

VIII—Gasoline Runabout Repairs.

By W. O. Anthony.

LOCKING DEVICE FOR CAP SCREWS.

In one or two makes of carriages the body is held to the chassis by cap screws going through angle irons, and the latter come so close to the sill of the body that there is no room for a lock nut, and sometimes scarcely room for a cotter pin. These screws have a tendency to work loose, especially after having been taken out a few times for the removal of the body, and this tendency is so strong that the writer has known a one-eighth inch cotter pin to be sheared off by them.

In such cases the scheme shown in Fig. 27 has been successfully applied. If this defect is allowed to go, it results in cracked panels, since the weight of the body tends to force the top of the angle iron A, Fig. 27, over against them. The offend-

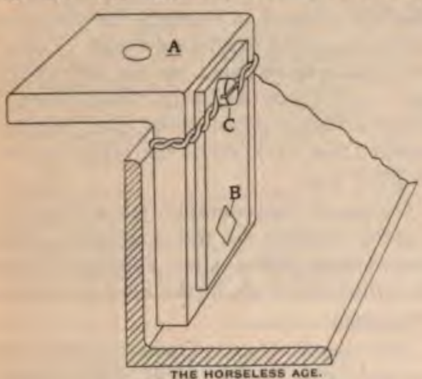


Fig. 27.

ing member of this combination is the cap screw B. The lock for this is constituted by the flat plate of iron C. This has a hole cut through it, as shown, to take the head of the cap screw, and this hole is cut in such a way that when the screw is firmly tightened up the edges of the plate will lie parallel with those of the angle iron. A hole is drilled and tapped at the top of the plate for about a No. 12 machine screw. A piece of stout wire is drawn once around the plate after it is in its final position, as shown, and the ends are looped under the head of the machine screw. This device forms an effectual lock and a sure preventive of a recurrence of the loosening of these screws.

It seems only right to add that, as these vehicles come from the factory, they are prevented from turning by several centre punch marks, made in the angle iron around the heads of the screws. After once removing them, however, for the purpose of taking off the body, these seem to lose their effectiveness in many cases.

DISMOUNTING ENCASED REAR AXLES.

There are several machines in which the halves of the casing surrounding the live

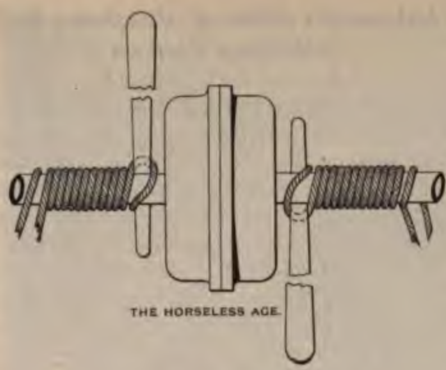


Fig. 28.

rear axle are put together by a fine thread in either half, these making up to a shoulder. They are fitted together so nicely, as a rule, that it is very difficult to detect the joint, and the repair man who attempts for the first time to get at the inside of this axle case for repairs, may be at a loss to know just how to go about it.

The parts may be separated, however, and the paint or enamel scarcely marred, by the use of what is known as a "Spanish yoke." This arrangement consists of two pieces of stout rope, each 6 or 8 feet long and about five-eighths inch in diameter. These are doubled, and, leaving about 6 inches or so of the loop free, the balance is wound about the axle case as close as possible to the joint to be broken. This is shown in Fig. 28. As the thread is almost invariably a right handed one, the loop should leave the case as shown in the figure. After wrapping very tightly around the case for a distance of, say, a foot and a half, the loose ends should be held firmly against the case with one hand, and a strong stick of hardwood about 1½ inches in diameter be put through the loop. An assistant should operate upon the other side in the same manner, but, of course, with the stick pulling in the opposite direction. Having previously removed any locking screws which normally keep the two halves from unscrewing, a steady pull upon both sticks will generally start the joint, although occasionally blows from a medium weight hammer struck along the joint will be necessary.

One great advantage of this apparatus lies in the fact that when anything happens upon the road, necessitating the separating of these halves—and the writer has had this experience upon two occasions—a piece of clothesline or its equivalent, which should be carried upon any trip, and a couple of fence rails, with the often meagre

Fig. 29.

tool equipment found in many tool boxes, will suffice to perform the operation.

RADIAL CRACKS OF WATER JACKETS.

In the article relative to the repairs upon a cracked water jacket, one item of importance was overlooked.

It not infrequently happens that these cracks assume a very irregular and broken outline, as in Fig. 29.

Such a break leaves two very weak points at A and B, and an attempt to caulk the break with copper in parts adjacent to these points would almost surely result in breaking out these corners.

To guard against this a couple of one-quarter inch studs should be threaded into both the jacket wall and the cylinder wall, thus reinforcing the former. If these studs come inside the cylinder in the clearance space, they should be run through one-thirty-second inch and riveted over solidly, but if they come into that portion of the bore swept by the piston this would be inadvisable, and the hole for the stud should be drilled and tapped only part way into the cylinder wall.

In tapping these holes, it must be done simultaneously in both cylinder and jacket walls, otherwise the latter will be apt to spring, as the top will not take hold at once in the hole in the cylinder wall. If a clamp is brought to bear firmly over a point as close to the hole being tapped as possible, this springing will be overcome.

HOW TO INCREASE MOTOR COMPRESSION.

In the more modern gasoline motor a marked increase in compression over that in the older patterns is noticeable. It is not surprising, therefore, that many of the older vehicles will not develop the power they should. The writer has in very many cases raised the compression, with always beneficial results. This may be done by applying a plate of cast iron to either the top of the piston or to the inner side of the cylinder head. The latter method is to be preferred always, because any weight added to the piston will destroy the balance of the motor, unless the other moving parts are altered to correspond.

The proper thickness of plate to give the best results is largely a matter of conjecture, and if one of the later models of the engine to be altered can be secured and a comparison of the compression spaces made this will be the better way. Otherwise the original percentage of compression space should be secured, and the desired percentage subtracted from it, when it will be a simple matter to make a wooden pattern containing the number of cubic inches necessary. The compression plate should not, under any circumstances, obstruct the port openings to the valves, and in many motors this will necessitate chamfering away the pattern at the part adjacent to the ports.

DETERMINATION OF COMPRESSION SPACE.

The original percentage of compression space on any motor may be readily ascertained in the following manner. Have the

inlet and exhaust valves closed and the piston at its innermost position. Now through the ignition plug opening, the cylinder being placed so this is uppermost, fill the compression space with water from a rectangular vessel so the cubical contents may be readily computed. Find the displacement in cubic inches of the piston, and with these two factors the clearance percentage of any motor, no matter how irregular its port passages, may be readily calculated.

The plate may be secured in place by two or three one-quarter or five-sixteenth inch cap screws, although in motors of very high speed and with a tendency to overheat, the projecting heads of these screws are quite liable to become incandescent and thus to cause premature ignition. In such cases flathead machine screws should be used and the head made flush with the surface of the plate and the centre punched around the edges at two or three points to preclude the possibility of their loosening.

Autos Prove Useful During a Railroad Strike.

Never before in the history of the Commonwealth of Australia were motor cars of such great service as during the strike of the railway engine drivers and firemen upon the Government railways. The whole of these men at the call of their unions left work at five hours' notice, with the result that the business of the whole state was paralyzed. Thanks, however, to the De Dion, Decauville and other motor cars mails and newspapers were conveyed to the country districts. In one case, we are informed by our Melbourne correspondents, Phillips, Ormonde & Co., a penny daily fetched 5 shillings, and as much as 6 pence a time was paid for a "read."

Automobile Club of Pittsburg Hill Climbing Contest.

The committee on hill climbing contest of the A. C. of Pittsburg had announced through the newspapers that the contest on the Highland Park hill would come off on Saturday, June 20, rain or shine, and when on Friday evening the weather man announced "rain tonight and Saturday," the prospects of a successful event were not particularly bright. The weather man proved right, however, for it not only rained all Friday night, but continued to rain up to the time of starting, which was delayed to 2:30, owing to the possible interference of rain with the electrical timing device.

There were forty-two entries in the contest, and, in spite of the weather, thirty-three showed up and ran. As stated in THE HORSELESS AGE of last week, the course had been but recently covered with a thick layer of crushed limestone and fine screenings, and had not been sufficiently rolled. In fact, in a number of places it was decidedly greasy, and in others the tires made marked depressions in the track.

There were quite a number of surprises, the most pronounced being the defeat of the Stanley wagon, driven by Reuben Miller, Jr., by the Foster, driven by W. H. Artzberger. It was another case of "appearances don't count," for the Stanley looked well groomed, clean limbed, no blemishes and lightly mounted, while the Foster looked—differently. The Stanley weighed 870 pounds, while the Foster weighed 1,285. Both carried high steam pressure. The Stanley went up the hill in 2m. 15s.; the Foster in 2m. 12 4-5s. Later on in an exhibition, the Stanley, driven by Mr. Miller's driver, went up the hill in 1m. 46s.

W. H. Artzberger's Foster Near Finish.

W. L. Mellon's Autocar Near Finish.

During the past two weeks there has been considerable "trying out" of the different machines over the course, and no doubt this is responsible for the withdrawal of more than one machine. Two owners acknowledged to the writer that there was no chance for their machines on such a course, owing to the sharp curves. D. N. Seely's Riker electric burned out a connection within the first 200 feet. W. P. McVay's White tonneau broke its pump after making the first turn. W. L. Smith's White tonneau started up the hill in fine shape; something went wrong with the pump, but he gamely stuck to it, finishing in 6m. 35s. As all mufflers were ordered closed, the Winton owners considered themselves handicapped. Of the three entries only one appeared. It was well driven and made the course in 3m. 24s. This seems to prove that an intermediate gear is not a bad thing for hills. With but one cylinder working, Louis B. Hays ran his Haynes-Apperson surrey up the hill in 5m. 23½s. This machine weighed 2,280 pounds. Arthur L. Banker's Peerless four cylinder 32 horse power racer was placed in Class E, cars under 2,000 pounds, but was not allowed to compete for the prize, being run as an exhibition event. From a standing start it went up the hill in 1m. 29 1-5s. Later on, with flying start, it failed to better its previous time, but it is claimed that only two of the cylinders were in good trim.

Owing to the condition of the weather quite a number of the contestants went home immediately after finishing, either forgetting the finals or thinking themselves outclassed

The course was over what is known as the serpentine drive in Highland Park, which is 2,200 feet in length, the first stretch of 300 feet being practically level. At this point a curve of 175 degrees with a diameter of but 110 feet and a grade of 6 per cent. is encountered. No matter what the speed on the level portion the driver must go slowly around this point, as it is banked on the near side. The course is a series of grades and curves until the top is reached which is 150.3 feet above the level starting point. It will be noted that no such fast time was made in this contest as in the Boston contest, which brings up the question of whether the Boston course was really a 13 per cent. grade. There were cars in the Boston contest that made very good time that were either not entered in the Pittsburg contest or withdrawn after "trying" the hill. Thirteen per cent. grades are rare even at Pittsburg, at the foothills of the Allegheny Mountains, although there are a few 18 to 22 per cent. grades. Six per cent. grades are frequently termed 15 and 20 by others than engineers. The grades as given for the Pittsburg course, together with the plan and profile published in our last issue, was prepared by the civil engineers connected with the park system of the city. 'Tis true the Boston course was but one-

of a mile long and practically straight, even then on a 13 per cent. grade a of only 50 feet would give very little nentum. It is to be hoped that in fu- the managers of all hill climbing con- s furnish official plans to the automo- press, as in this manner only can value placed on the relative working power he machines.

or timing, the committee had erected rivate telephone line and a bell sys- . One of the judges and two of the nmittee were located at the starting nt and two judges and one committee- n at the finish. An operator was placed the telephone at each end of the line. car was driven up and stopped with front hubs on the starting line. The ges were then notified by a ring of the that the contestant was ready, and at word "go" the bell was again touched. operator at the starting point would n give the operator at the finishing nt the number of contestant, name of and owner. Each contestant had pre-

MACHINES GATHERING AT STARTING POINT (TELEGRAPH POLE).

viously been provided with a card about 4x5 inches, on which was his number, the name of his car, the owner and the driver. When he arrived at the top and passed over the line he handed his card to one of the judges, who immediately wrote the time on the card and affixed his own signature. The other judge placed the time on an official record. No hitch whatever occurred, and machines that were called back or sent back (always by another route) were quickly reported at the other end. On this page is a tabulated record of the contest.

The winners of the cups were:

The Committee Cup—Arthur L. Banker. Class A, Waverley Electric. Time, 3m. 3s.

The W. C. Temple Cup—W. H. Artzberger. Class B, Foster Steam. Time, 2m. 12 4-5s.

The Reed W. Bailey Cup—S. A. Stewart. Class C, Northern. Time, 3m. 37s.

The George H. Flinn Cup—T. F. T. Lovejoy. Class D, Pierce. Time, 2m. 29s.

The Banker Brothers Cup—F. A. McCune. Class E, Darracq. Time, 2m. 21 1-5s.

The Reuben Miller, Jr., Cup—A. E. Mastin. Class F, Peerless. Time, 2m. 11s.

The Club Cup—G. E. Turner. Finals, Peerless. Time, 2m. 10 3-5s.

The contest was in charge of a committee composed of Thos. R. Hartley, George L. Hailman and Dr. John A. Hawkins. The judges were W. C. Temple, W. H. Nimick and Richard Pollard.

CLASS A.—ELECTRIC.

Car.	Owner.	Driver.	Weight Car.	Time.
Riker	D. N. Seely	D. N. Seely	2,755	Burn'd out con'n
Studebaker	W. N. Murray	B. L. Brown	1,525	4:14
Waverley, 3 h. p.	A. L. Banker	H. B. Barnes	840	3:03
Columbia	T. R. Hartley	C. C. Clark	2,200	4:53⅗
Columbia, 3 h. p.	H. A. Marlin	H. A. Marlin	2,190	4:18⅕
Columbia, 4 h. p.	J. F. Burke	J. J. Burke	2,200	4:34

CLASS B.—STEAM.

Car.	Owner.	Driver.	Weight Car.	Time.
Stanley, 4 h. p.	Reuben Miller, Jr.	Reuben Miller, Jr.	870	2:15
White Tonneau, 10 h. p.	Peter Hermes	Lew Maisack	1,975	2.48
Foster, 5 h. p.	W. H. Artzberger	W. H. Artzberger	1,285	2:12⅘
White Tonneau, 10 h. p.	W. L. Smith	W. L. Smith	1,820	6:35
Toledo, 6 h. p.	J McD. Mashey	J McD. Mashey	1,445	3:44⅗
White Tonneau, 10 h. p.	W. P. McVay	W. P. McVay	1,930	Broken pump.
White Stanhope, 6 h. p.	J. H. Lindsay		1,430	Withdrawn.

CLASS C.—GASOLINE, UNDER 1,000 POUNDS.

Car.	Owner.	Driver.	Weight Car.	Time.
Orient Buckboard, 4 h. p.	D. N. Seely		475	Withdrawn.
Duryea (3 wheeler), 10 h. p.	Dr. W. C Cook		995	Withdrawn.
Oldsmobile, 4 h. p.	Ed. C. Haus	H. Griffin.	960	3:39⅖
Northern, 5 h. p.	S. A. Stewart	S. A. Stewart	995	3:37
Pierce, 6 h. p.	J. G. Splane	E. C. Haus	1,000	5:17⅕

CLASS D.—GASOLINE, 1,000 TO 1,500 POUNDS.

Car.	Owner.	Driver.	Weight Car.	Time.
Franklin, 10 h. p.	Reed W. Bailey		1,130	Withdrawn.
Franklin, 10 h. p.	Ed. Kneeland		1,170	Withdrawn.
Franklin, 10 h. p.	D. H. Hostetter	L. Creter	1,200	3:09⅕
Pierce, 8 h. p.	T. F. T. Lovejoy	E. C. Haus	1,260	2:29
Autocar, 8 h. p.	Geo. L. Hailman	Paul Wolfe	1,095	3:29⅕
Stevens Duryea, 7 h. p.	J. A. Pietsch	Ship'd too late from fac'y	1,200	Withdrawn.
St. Louis 8 h. p.	Wm. J. Young	H. Anderson	1,460	3:18⅗

CLASS E.—GASOLINE, 1,500 TO 2,000 POUNDS.

Car.	Owner.	Driver.	Weight Car.	Time.
Autocar, 10 h. p.	W. L. Mellon	E. C. Haus	1,600	2:26
Autocar, 10 h. p.	Dr. J. A. Hawkins	D. P. Collins	1,630	2:40
Mercedes, 18 h. p.	Geo. H. Flinn		1 900	Withdrawn.
Peerless Racer, 32 h. p.	A. L. Banker (exhibition)	D. P. Collins	1,930	1:29⅕
Darracq, 12 h. p.	F. A. McCune	F. A. McCune	1,715	2:21⅕
Decauville, 10 h. p.	Thos. M. Guffey	Thos M. Guffey	1,800	3:42⅖
Clement, 12-14 h. p.	Thos. R. Hartley		1,745	Withdrawn.
Winton, 16 h. p.	W. N. Murray		2,000	Withdrawn.
Autocar, 10 h. p.	Clarence Fleming	E. C. Haus	1,630	2:49⅗
Autocar, 10 h. p.	Dr. Geo. A. Urling	M. B. Noonan	1,640	3:05⅘
Autocar, 10 h. p.	C. H. Dixon	M. B. Noonan	1,600	2:55⅘

CLASS F.—GASOLINE, OVER 2,000 POUNDS.

Car.	Owner.	Driver.	Weight Car.	Time.
Peerless, 16 h. p.	A. R. Neeb	A. J. Brackney	2,200	2:30⅕
Peerless 16 h. p.	C. E. Turner	E. C. Haus	2.140	2:20⅕
H'y's-Ap'n, (sur'y) 16 h. p.	Louis B. Hays	Thos. Park	2,280	5:23⅕ (1 cyl.)
Winton, 20 h. p.	Joseph Reed	L. Creter	2,500	3:24
Gasmobile, 12 h. p.	Thos. R. Hartley	Thos. R. Hartley	2,280	2:48⅘
Peugeot, 10 h. p.	Geo. H. Flinn		2,230	Withdrawn.
Winton, 20 h. p.	Robert Pitcairn, Jr.		2,575	Withdrawn.
Peerless, 16 h. p.	A. E. Masten	E. C. Haus	2,150	2:11

FINALS.

Car.	Time.	Remarks.
Studebaker	4:20	
Waverley	3 29⅘	
Stanley	....	Accident to machine near finish.
Foster	....	Car caught fire and owner drove home.
Oldsmobile	4:01	
Northern	....	By mistake, owner went home.
Franklin	....	By mistake, owner went home.
Pierce	2:31⅘	
Autocar	2:27⅕	
Darracq	2 19⅘	
Peerless	2:10⅗	
Peerless	....	By mistake, owner went home.

Gabriel has been substituted for Henri Fournier as a member of the French team for the Gordon Bennett Cup Race.

Alexander Winton and Percy Owen arrived at Queenstown on June 6. They took a run over the Gordon Bennett course in a 20 horse power touring car and expressed themselves as well satisfied with it.

LEGISLATIVE AND LEGAL.

Important Judicial Opinions on the Rights of Automobiles on the Highways.

There are still many States in the Union in which the legal status of the automobile is not defined by special laws, and from such States we frequently have inquiries for judicial opinions favorable to automobiles, to meet threats of prosecution, etc. The most important opinions of this kind are undoubtedly the following: Charge to the jury by Justice Charles F. McLean, of the Supreme Court of New York city, in the case of Collard vs. Beach (December, 1901); charge to the jury by Judge William J. Gaynor, of the Supreme Court of Nassau County, New York, in the case of Charles W. Knight vs. James F. D. Lanier (March 27, 1901), and an opinion by Judge Monks, of the Indiana Supreme Court, in the case of Claude Bennett vs. Edward Bogue (April 18, 1901).

The case of Collard vs. Beach arose out of an accident in 1898 on the main highway between Bridgeport and Stratford, Conn. A horse belonging to Dr. George W. A. Collard, of Bridgeport, was frightened by an electric automobile belonging to Frederick G. Beach, of Stratford, and Collard brought suit to recover $50,000 for damages caused by the runaway. The evidence failed to sustain any ground of negligence on the part of the driver of the electric vehicle and the jury decided in favor of the defendant. In charging the jury Justice Charles F. McLean said, among other things:

JUDGE M'LEAN'S OPINION.

"A man who brings another into court is bound to prove the very case he sets out or fail, whether you or I think that he might have proven another case and made the defendant liable. The highways are for us all; all can use them, with reasonable regard, to be sure, for others who use them. * * *

"The most common motive power on the highway is a horse, but the horse has no paramount exclusive right to the road, and the mere fact that a horse takes fright at some vehicle run by new and improved methods, and smashes things, does not give to the injured party a cause of action. It is true, as in other cases, that the mere fact that an accident happens does not make it the fault of someone else and make it his duty to pay for it. When the highway is not restricted in its designation to some particular mode or use, it is open to all suitable methods, and it cannot be assumed that those will be the same from age to age, or that new means of making the way useful must be excluded, merely because their introduction may tend to the inconvenience or even injury of those who continue to use the road after the same manner as formerly.

"It is to be presumed that those who use the road know the uses to which the road is put, and that we should be aware—we who drive on the road should be aware—that bicycles, that vehicles operated by other motive power than horse power or oxen, use it, and that we should be upon the alert, reasonably on the alert, as to what dangers, if any, or surprises, if any, may come to us.

"Now, if the plaintiff perceived that this vehicle was in the road he was bound to act as would a reasonable, prudent man with regard to his own horse, and that and the circumstance, if you believe it to be true, that his horse had been frightened by such a vehicle before, was a circumstance that should be taken by him into consideration.

"Not only have the roadways improved very much within our experience, but the means of travel have improved very much also; and the fact that the introduction of new means of locomotion may inconvenience others is not usually a reason for inhibiting it. The prejudices of the 'road driver' (a phrase very familiar to most of us in this town) are not to control the means of locomotion to be used by the public. Much has been said about the swiftness of the vehicle and about its relative freedom from noise. Within limits, freedom from noise is of very great moment to the whole community, not merely to the persons who use the vehicles but to persons living by the roadside and the persons who use the road. Within limits, too, the swiftness with which persons are enabled by modern vehicles to go from place to place is of great moment also.

"If you come to the conclusion that both sides were at fault, the plaintiff in the management of his horse or lack of precaution which he took, and the person who was operating the vehicle, then the verdict must be for the defendant, because the law will not apportion the fault between the two. If a man is at fault (so at fault that he helps bring about an accident) he cannot recover."

JUDGE GAYNOR'S OPINION.

In the case of Knight vs. Lanier Judge William J. Gaynor's charge to the jury was in part as follows:

"The precise claim of the plaintiff here is that the defendant was negligent in the management of this automobile, in that seeing the horse unmanageable, and seeing the plaintiff and his party in a dangerous predicament with the horse, he nevertheless started up the automobile and added to that predicament, made it worse than it was, and in that way made the horse get beyond control and throw the plaintiff and turn the wagon over and get away.

"Now there is no question with you and me about the rights of the defendant in this lane or in the highways.

"Far be it from us to have any prejudice against a horseless carriage.

"To be sure, the world is filled with all sorts of stupid prejudices, always was (and always will be, I suppose) about every change that ever occurred in the world. Even the best one that we can think of was met by, I suppose, the majority of people with some stupid prejudice against it. Whether in religion, or in science, or in material progress, or what not, that seems to be the fate of everything and everybody who gets a little ahead of anybody else, who gets something that is new, something that is not just the same as existed, or is not in conformity with the existing order of things. But here we have no such prejudice.

"The automobile has as much right in the street as the horse has. The bicycle used to be under the ban, but nobody now thinks of having any ill feeling against the bicycle.

"The same way the improvement of the automobile is good. Many saw it was good from the start.

"In addition to that, the law is with this means of travel. It has a right in the street, as much right as a horse has, and to some extent it is superseding the horse, and is useful and pleasant, and by all means let this defendant have an absolutely fair show as far as that is concerned.

"He had a right in the lane, so had the horse a right in the lane.

"It is said he was coming down with great speed. You must dismiss that from your mind, too, because, if he caused this accident, he did not cause it by speed; on the contrary, the evidence on both sides is that he stopped before he came to this horse, and the plaintiff got out and took hold of his horse, and there is evidence here to the effect that even then the horse was prancing and possibly rearing, at all events in a state of irritation and fear apparently. It may have been a stupid horse and did not know any better; but, however that may be, that is the situation so far as some of the proof goes, if not all of the proof. I do not know but what it was quite agreed; but that, however, is for you to remember from yesterday; the horse, even after the automobile stopped, was uneasy and apparently frightened.

"So that the speed of the automobile is not here, but this point is here: It is claimed by the plaintiff that, having stopped there, and seeing the plaintiff trying to hold his horse, and the horse in a state of excitement, and the plaintiff in a predicament, with his family in the wagon and he trying to hold the horse, that nevertheless the defendant started up his automobile and added to that predicament and made the horse uncontrollable, and that he did that negligently. Unless that is so there is no case for the plaintiff here at all."

JUDGE MONKS' OPINION.

In the case of Bennett vs. Bogue it was argued that the defendant, who had been driving a steam car when the accident occurred, had been violating a city ordinance

of Kokomo, Ind., which prohibited the running of steam vehicles on the streets of the city. Judge Monks, in his opinion, said:

"Indiana municipal corporations have no powers except such as are granted to them by the express words of the statute under which they are organized, or by necessary implication. No incidental powers can be implied, except such as are essential to the accomplishment of the purposes of their creation and continuance. Ordinances passed pursuant to the powers possessed by cities must be reasonable, or they will be pronounced invalid. The general grant of authority over the streets and highways given by the statute does not authorize the enactment of an ordinance unreasonable in its provisions. Highways and streets are not for the exclusive use of vehicles propelled by animal power, nor are travelers confined to the use of such power and to ordinary carriages on highways. The use of any new and improved means of locomotion must be deemed to have been contemplated when the highways and streets were laid out and dedicated whenever it was found the general benefit required it, and such means of locomotion cannot be excluded therefrom, merely because their use may tend to the inconvenience or even to the injury of those who continue to use the highways and streets by former methods.

"To say that the new method of travel shall be banished from the streets, no matter how much the general good may require it, simply because the streets were not so used in the days of Blackstone, would not comport with the advancement and enlightenment of the present age.

"Persons making use of horses as a means of travel or traffic by the highways have no rights therein superior to those who make use of the ways in other modes. While locomotion on public ways has hitherto been chiefly by means of animals, yet persons using them have no prescriptive right and are entitled to the same reasonable use of the ways which they must accord to all others.

"Improved methods of locomotion are perfectly admissible, if any shall be discovered, and they cannot be excluded from the existing public roads, provided their use is consistent with present methods. The restrictions upon the use of highways are only such as are calculated to secure to the general public the largest practical benefit from the enjoyment of the easement, and the inconveniences must be submitted to where they are only such as are incident to a reasonable use under impartial regulations.

"When highways are not restricted to some particular use they are open to all suitable methods, and it cannot be assumed that these will be the same from age to age, or that new means of making the ways useful must be excluded merely because this introduction may tend to the inconvenience or even to the injury of those who continue to use the roads after the same manner as formerly. A highway established for the general benefit of passage and traffic must admit of new methods of use whenever it is found that the general benefit requires them, and if the law should preclude the adoption of the use to the new methods, it would defeat in greater or less degree the purposes for which highways are established.

"Horses may be and often are frightened by the newly adopted locomotions, but it would be as reasonable to treat the horse as a public nuisance for its tendency to shy and be frightened by unaccustomed objects as to regard the vehicle propelled by new methods of locomotion as a public nuisance from its tendency to frighten horses. The use of the one may impose upon the manager of the other the obligation of additional care and vigilance beyond what would otherwise be essential.

"If one in making use of his own means of locomotion is injured by the act or omission of the other, the question is not one of superior privilege, but is a question whether under all the circumstances there is negligence imputed to some one, and if so, who should be accountable for it."

Proposed Bill to Provide for Untaxed Denaturized Alcohol.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That distilled spirits of an alcoholic strength of not less than 160 per centum proof, as defined by Sections 32 and 49 of the Revised Statutes of the United States, may, when rendered unfit for drinking purposes, or for use as a beverage, be removed from distillery warehouses free of tax under such regulations as the Commissioner of Internal Revenue, with the approval of the Secretary of the Treasury, shall prescribe: Provided, That wood alcohol, methylic alcohol, wood naphtha, or other substances approved by the Commissioner of Internal Revenue and the Secretary of the Treasury, shall be mixed with such distilled spirits as to render the same unfit for drinking purposes, or for use as a beverage: And provided further, That this act shall only apply to distilled spirits produced or manufactured in distilleries having a registered daily capacity of at least 4,000 proof gallons.

Sec. 2. That distilled spirits before being removed from distillery warehouses free of tax under the provisions of this act shall be marked or branded as the Commissioner of Internal Revenue, with the approval of the Secretary of the Treasury, shall prescribe, and shall have affixed to each cask or package an engraved stamp indicating that such distilled spirits have been rendered unfit for drinking purposes, or for use as a beverage, said stamps to be provided and furnished by the several collectors, as in the case of other stamps, and to be charged to them and accounted for in the same manner; and for the expense attending the providing and affixing of such stamps, 10 cents for each stamp shall be paid to the collector of the district on making the entry for such removal.

Sec. 3. That any person who shall rectify or purify distilled spirits which have been removed from distillery warehouses free of tax under the provisions of this act, by removing or separating the wood alcohol, methylic alcohol, wood naphtha or other substances from such distilled spirits, by any process whatever, shall, on conviction, be subject to a fine of not less than $500 nor more than $5,000, and be imprisoned not less than six months nor more than three years.

Sec. 4. That distilled spirits, removed free of tax from distillery warehouses under the provisions of this act, shall not be stored or deposited on any premises in which the business of a distiller, rectifier, wholesale liquor dealer or retail liquor dealer is carried on, or on any premises connected therewith by any private or internal communication. And every distiller, rectifier, wholesale liquor dealer and retail liquor dealer, who shall store or deposit or cause to be stored or deposited, such distilled spirits on the premises in which such business is carried on, after such distilled spirits have been removed from distillery warehouses, shall, on conviction, be fined not less than $200 nor more than $1,000, and imprisoned for not less than six months nor more than two years.

Memphis Park Board Passes Offensive Measure.

The Board of Park Commissioners of Memphis, Tenn., has adopted the following rules to govern the operation of automobiles in the public parks:

(1) No automobile shall be run at a rate faster than 4 miles per hour in any of the public parks.

(2) When an automobile encounters a restive horse the machine must be brought to a full stop.

Judge McFarland, the acting president of the park board, made the statement that these regulations will be tried for a while, and if it is found that they cannot be enforced, or that, when enforced, they fail to give the results expected of them, more drastic rules will be adopted.

The new rules are strongly objected to by Memphis automobilists, and it cannot be denied that the 4 mile limit is most unreasonable, particularly in view of the conditions in Memphis parks. Overton Park is situated in the suburbs and covers over 400 acres of land, but is at present visited by probably not more than 100 persons a day. Memphis is a growing city of over 125,000 inhabitants, and it would be well for its authorities to shake off some of the backwoods prejudice to modern methods of travel so apparent in their new rules. Harassing restrictions have been adopted by the park authorities of various other cities at different times in the past, but at present the machines are allowed to pro-

ceed at nominally 8 miles an hour in Central Park, New York city, where the afflux of visitors is certainly much greater in proportion to area than in any of the Memphis parks, and actually at a considerably faster speed before an arrest is made. In some other cities even higher speeds are allowed in the parks, though 8 miles an hour is probably the average limit in the parks of large cities. The 4 mile limit is impossible, and so slow a gait, instead of preventing the shying of horses would tend to increase it, as the machines have to be run on a low gear, which increases both noise and vibration, important factors in the frightening of horses. Hence, if the rules of the park board should fail to have the desired effect, it will probably be because they are too drastic as to speed.

Serious Charge Against Automobile Driver.

Arthur Anson, of Cincinnati, seventeen years old, has been placed under arrest on a charge of murder alleged to have been committed with an automobile. On the evening of June 17 Anson drove a medium weight runabout belonging to his employer, A. L. Rich, when at the crossing of Blair and Sidney avenues the car collided with an aged woman, Mrs. Mary Niemeier, inflicting serious injuries, from which the victim died the next day. Anderson was at first placed under a charge of reckless driving and released under $1,000 bail, but upon the death of Mrs. Niemeier he was rearrested charged with murder. Anson's employer states that the former at the time of the accident was running the machine for his own pleasure and without his (the owner's) consent. It is also alleged that shortly before the accident a police officer had made an ineffectual attempt to cause the accused man to slow down, and that the latter did not possess the required license to operate an automobile. Anson has been an inmate of the House of Refuge, where he was sent at the complaint of his mother, who was unable to control him.

Seven miles in the business district and 12 miles in the residence district have been decided upon by the council of Omaha, Neb., as the speed limits per hour for automobiles.

Cottagers on the ocean drive at Newport, R. I., have organized again to prevent overspeeding of automobiles on that thoroughfare, and have subscribed a fund to prosecute offenders.

William A. Fuller and Victor Paget, the young automobile operators who were charged with having caused the death of Daniel J. Crowley in Boston, Mass., on May 18, have been released after a hearing.

The city council of Nashua, N. H., have adopted an ordinance which provides that automobile and motor cycles shall carry lighted lanterns after dark. Another ordinance has been introduced limiting the speed of automobiles and motor cycles to 6 miles an hour.

John H. Robinson, the chauffeur of C. G. Norton, of Milwaukee, Wis., was fined $25 on June 17 for using a horn instead of a bell on his automobile.

The equalization board of Fremont, Neb., has adopted a resolution to list all automobiles which were in use in the county prior to April 1 of this year at $50.

The Memphis, Tenn., city council has been petitioned by automobilists to pass an automobile ordinance limiting speed to 12 miles an hour in the old city districts and to 15 miles an hour in new districts or suburbs. This ordinance will be acted on at the next council meeting in July.

The Judiciary Committee of the Connecticut Legislature has favorably reported a bill providing that "except for the transportation of agricultural machinery, no motor vehicles shall be used on any highway for the purpose of drawing or propelling other vehicles loaded with freight, merchandise or property."

At a recent meeting of the common council of New Rochelle, N. Y., it was decided that the speeding of automobiles in the Boston post road through the city must stop, and the police commissioners were directed to enforce the ordinance. It is proposed to place gates at each end of the city to head off violators of the laws.

John C. Wright and E. F. Claypool have started a fight in the city council of Indianapolis, Ind., against John B. Cockrum's proposed automobile storage plant, to be constructed on East Vermont street, and have had introduced an ordinance preventing the construction of an automobile plant within the district where they are heavy property holders.

Mansfield, Ohio, has passed an automobile ordinance which provides that no automobilist may drive his machine within the corporate limits at more than 10 miles an hour; that he must be duly registered with the city auditor and given a number which he must display conspicuously on his machine; that he must keep one lamp burning in the night season; that he must provide himself with a whistle or bell, and that he must stop when signaled to do so by the driver of a horse conveyance. The penalty for violation is not more than $100.

The House Committee on Ways and Means of the Massachusetts Legislature has reported that the automobile bill as recommitted ought to pass. The new draft is regarded as a compromise measure. The speed limit is fixed at 15 miles in the country and 10 miles in city limits; violations are punishable by a fine of not exceeding $50 for the first offense and of $100 for subsequent offenses and for operating an automobile after a suspension or revocation of a license by a fine not exceeding $100 or by imprisonment not exceeding ten days or both. The suggested license amendment permitting owners accompanied by someone who has a license to operate a machine is omitted.

MINOR MENTION

In our recent description of the Phelps touring car we failed to mention that it is furnished with a detachable tonneau.

The Doctor of Science degree was conferred upon Peter Cooper Hewitt, inventor of the Hewitt mercury vapor lamp, at the commencement exercises at Columbia University recently.

On the latest types of Darracq cars with honeycomb radiator, in which the water spaces between the tubes are very narrow, distilled water is used to prevent filling up of the spaces with lime.

A. J. Kindall, of Bluffton, Ind., is building a 10 horse power steam machine for a piano delivery wagon and will make two seats, to be placed on the rear part of the wagon, to enable him to carry six passengers.

The Century Motor Vehicle Company, of Syracuse, N. Y., is reported to be considering an offer from the New Haven Cash Register Company to build a factory in that city.

The Baldwin Automobile and Cycle Chain Company have recently extended their business and are now making special and standard chain sprockets and are preparing to do gear cutting for automobile and other purposes.

Charles J. Glidden and Mrs. Glidden, of Boston, Mass., started on June 16 on an automobile trip to Christiania, Norway, and northward within the Arctic Circle. They carry the colors of the Massachusetts Automobile Club.

Barney Oldfield lowered the track record for one mile to 59 3-5 seconds on an elliptic track at Indianapolis on Saturday, June 20, and also reduced the time for five miles. The record was made in a pursuit race with Tom Cooper in his "999" racer, and the performance netted Oldfield $1,200 from the race management.

E. T. Fetch, of Jefferson, Ohio, and M. C. Krarup, New York city, started from San Francisco, Cal., on Saturday, June 20, for a trip across the continent in a 12 horse power Packard car. The itinerary mapped out is as follows: San Francisco, Sacramento, Placerville, Carson City (Nev.), Reno, Wadsworth, Winnemucca, Salt Lake City (Utah), Green River, Glenwood Springs, Denver. A camping outfit is carried, the machine is geared specially low and an extra fuel tank has been fitted.

The Howard Automobile Company, 67 Dock street, Yonkers, N. Y., will shortly place on the market three styles of touring cars, viz., a two, a three and a four cylinder machine. The company has made arrangements with the Gas Engine and Power Company and Chas. L. Seabury & Co., Consolidated, Morris Heights, New York city, to manufacture the mechanical equip-

ment for these vehicles. A light delivery with a twin cylinder motor will also be added to the above line of machines.

George O. Draper, of Hopedale, Mass., is building a new automobile.

An automobile line from St. Paul, Minn., to Minnehaha Falls is suggested.

The Electric Vehicle Company, of Chicago, Ill., has removed to 1413 Michigan avenue.

A. A. Ball, of the Thomson-Houston Company, of Lynn, Mass., is reported to be testing a new design of steam carriage.

The E. R. Thomas Motor Company, of Buffalo, N. Y., has been admitted to membership in the Association of Licensed Automobile Manufacturers.

The Cudell Company are to establish a Boston agency in the Park Square Auto Station and a few sample cars are expected soon. Angier & Whitney are the agents.

Fourteen dealers of Chicago, Ill., have formed an association for mutual protection, and a committee of five has been appointed to draw up a constitution and bylaws.

It is reported that a company will be formed in Topeka, Kan., to operate an automobile line from the north end of Kansas avenue to the south end of Kansas avenue bridge.

The Ralph Temple & Austrian Company intend giving up their Michigan boulevard (Chicago) store on July 1 and will handle all their automobile business from the Wabash avenue establishment.

The Minneapolis Riding and Driving Club, of Minneapolis, Minn., will hold an automobile and motor cycle exhibition and race meet at the State Fair track on June 30 and July 1, 2 and 3. Silver cups and cash will be given as prizes.

It is reported that the Videx Automobile Company, of Boston, Mass., will close down until September, when they will enlarge their plants at Marlboro and Stoneham, Mass., and begin the manufacture of a new steam rig and a medium priced gasoline car.

A new concern, under the name of the Sola Company, has leased the premises at 1172 Fifth avenue, New York city, and announces that it is ready to store, rent and repair all kinds of automobiles. A general business in second hand machines is also to be undertaken.

Colcord Upton, formerly vice president of the Upton Machine Company, of Beverly, Mass., has withdrawn all his interests in that company, and is incorporating and has taken offices at 144 West Thirty-ninth street, New York, where he will continue in the manufacture of two and three speed transmission gears of new and improved design.

Recent improvements in the Jones Speedometer are aluminum casing and drive rings for those who prefer the lighter metal to brass. A saving in weight of nearly one-half is effected by the change. Several new types of this instrument have been developed recently, and styles are now made that indicate speeds in kilometres, register up to 100 miles an hour, or show the revolutions per minute of marine engines.

The carrier between Bowdon and Denhoff, N. Dak., is said to have ordered an automobile for carrying the mails.

An automobile race at Montgomery Park, Memphis, Tenn., under the management of a committee of the vestry of St. Luke's Church, is said to be contemplated on June 27.

The Hogan Motive Power Company, recently incorporated under Delaware laws with $100,000 capital stock, is constructing a plant at West Haven, Conn., for the manufacture of two cycle launch and automobile motors, invented by Prof. J. J. Hogan, formerly of Yale University.

Banker Brothers Company, of Philadelphia, Pa., report the following sales for the week ending June 20: Orient buckboard to Walter Du Pree, of Philadelphia; two Knox cars to Morse, Williams & Co.; Autocars to C. B. Geisel, Walter A. Bailey and J. W. Van Dyke, all of Philadelphia.

The Packard Motor Car Company, of Warren, Ohio, say the statement which has been published that the price of their four cylinder car would be $2,500 is absolutely without foundation, and that it will sell at very close to the same figure at which they retail it this season, viz., $7,500.

The experiment of operating an automobile between Durango and Aztec, Col., is being tried, but the first trip is reported not to have been as successful as the promoters expected. An exchange declares that "the idea of a broad track mobile over a narrow track country is insanity compounded."

The Springer Motor Vehicle Company have moved from New Haven, Conn., to Nos. 242 and 244 West Forty-first street, New York city, where they will manufacture gasoline vehicles only, including a surrey and a delivery wagon. Frank Clark, formerly the Knox agent at New Haven, has been appointed superintendent.

The first Moyea touring car, built by the Moyea Automobile Company, of New York city, has just made its appearance. Except in the substitution of aluminum for wood mud guards, and some changes in body lines, the machine is substantially the same as the model exhibited at the New York Show, and described in our issue of February 11, 1903.

A company to manufacture automobiles is being organized at South Bend, Ind., and will be known as the South Bend Motor Vehicle Company. Among the officers of the company are Parker H. Sercombe, of Chicago; Jacob Woolverton and J. B. Birdsell, of South Bend. The purchase of the Miller-Knoblock Electric Manufacturing Company plant is contemplated.

A new garage has just been opened at 623 Bergen street, Brooklyn, N. Y., by Charles A. Carlson, formerly in charge of the New York repair department of the Winton Motor Carriage Company. In addition to a general storage and repair business, Mr. Carlson purposes to build both pleasure and commercial vehicles, the mechanical details of which he is not yet prepared to announce.

As a result of legislation in behalf of good roads in Florida the county commissioners of Duval County are thinking of laying their first road from Jacksonville to Pablo Beach, 18 miles away.

Thomas B. Jeffery & Co. are said to have purchased 26 acres of ground adjoining the plant of the present factory at Kenosha, Wis., for the erection of additional buildings. The company will also build a half mile track for testing automobiles.

The A. A. A. has just sanctioned race meets that are to be held at Elyria and Columbus, Ohio, on July 4, and at Fort Wayne, Ind., on June 27. Solid silver cups, of a value of $25 each, have been provided for the winner of each race at Elyria. At Columbus ribbons will be given. Barney Oldfield and Tom Cooper have entered for the Columbus and Fort Wayne events.

The Empire Storage Battery Company, formerly at 154 East Fifty-seventh street, New York, has opened a garage, exclusively for electric vehicles, at 13 East Thirty-ninth street. A specialty will be made of selling storage batteries with a guarantee to keep them in order indefinitely for a small regular charge. Two electrical contractors are understood to be back of the venture.

One of the largest and best equipped garages in the city has just been opened by A. J. Raymond & Co. at 334 to 340 West Forty-fourth street, New York city, in charge of W. K. Hadley, formerly with the Oldsmobile Company. Agency arrangements with several manufacturers are about concluded. It is understood that the Darracq is to be one of the machines handled. Fifteen thousand square feet of floor space, all on a level with the street, have been secured. Unusual facilities for fighting gasoline fires, including sand pumps, grenades, extinguishers, etc., have been provided. All gasoline, oil, etc., is stored underground. Ten charging plugs are provided for electric vehicles.

One often comes across people who are waiting for the automobile to be perfected before purchasing one. If they wait for this they will have to buy the vehicle in another world, since perfection is never to be obtained. If we look back to the first practical locomotives made by Stephenson and those of today, we shall not find a single principle altered throughout. The two are very different, but the alterations and additions are simply due to the greater demand made upon the modern locomotive, the public having availed itself so largely of the railway, and daily asking for more speed. The same remarks apply to the motor car.

Club Notes.

LOUISVILLE A. C.

Over twenty members of the Louisville (Ky.) Automobile Club started on the first country run on June 14. The destination was Shelbyville. The club has decided to take a similar trip every Sunday during the summer.

RHODE ISLAND A. C.

The Rhode Island Automobile Club, of Providence, R. I., will, it is said, hold its annual race meet late in August. It is now negotiating for the appearance at that meet of some of the most noted of foreign chauffeurs.

HUDSON COUNTY A. C.

A large number of the members of the Hudson County Automobile Club, of Jersey City, N. J., on June 14 had a run to Hillsdale, where they were the guests of Boulevard Commissioner Daniel Lewis at his farm.

MASSACHUSETTS A. C.

The proposed visit on June 13 of the Massachusetts Automobile Club, of Boston, to Providence, R. I., where they were to be entertained by the Rhode Island Automobile Club, was postponed to June 20 on account of the storm.

A. C. OF ALLENTOWN.

Automobile Club of Allentown, Pa., ganized on June 12. The following officers elected: President, A. E. Stahler; vice president, Homer Addams; secretary, S. A. Weishampel; treasurer, J. P. Fry; captain, Homer Addams.

NORFOLK A. C.

Fifteen automobilists of Norfolk, Va., met at the office of W. H. Trice on June 15 and organized an automobile club. The election of officers resulted as follows: President, W. S. Royster; vice president, Dr. Walter J. Adams; secretary and treasurer, Roy J. Collins. These, with Dr. Lomax Gwathmey and H. H. Trice, constitute the executive board.

A. C. OF BUFFALO.

The board of governors of the Automo- Club of Buffalo, N. Y., have approved ules drafted by the president, and they nt now be submitted to the club for adop- .ion. They limit the membership to 500. Members who scorch may be admonished or suspended by a two-thirds vote of the board of governors on the written complaint of one or more members or of the grievance committee.

A. C. OF SYRACUSE.

The Automobile Club of Syracuse, N. Y., at its last meeting determined to hold an automobile race matinee on the afternoon of July 4, either on the State Fair Ground mile track or the half mile track at Kirk Park. A committee, consisting of C. Arthur Benjamin, W. S. Brown and Hurlburt W. Smith, was appointed to make the arrangements. Harry C. Pierce, Carl L. Amos, George A. Brockway, of Homer; J. S. Leggett and C. S. Kennedy, Syracuse, were elected members. The next club run will probably be to Utica.

A. C. OF UTICA.

The Automobile Club of Utica has been formed at Utica, N. Y., with the following officers: President, Eduard Bushinger; first vice president, F. DeW. Smyth; second vice president, Robert M. Hunt; secretary and treasurer, Harry H. Mundy. The club starts with seventeen members. It has been decided to join the New York State Association, and A. J. Baechle has been named as the club's delegate.

NEW YORK M. C. C.

Because the hotelkeepers of Palmer, Mass., deem themselves unequal to the task of providing for both a Fourth of July crowd and the participants in the endurance run of the New York Motor Cycle Club and the Metropole Cycling Club, of New York city, the committee has been compelled to alter the route to Worcester. The change materially shortens the distance. On the first day, July 3, the run will be from New York to Springfield, 145 miles; on July 4 from Springfield to Worcester, where the turn will be made and the route retraced to New York via Hartford.

ROCHESTER A. C.

The first run of the Rochester (N. Y.) Automobile Club took place on June 17 to Summerville. The pace (8 miles) was set by Mrs. G. G. Foster, and the line, with the automobiles running about 40 feet apart, is said to have been nearly two miles long. The run was made in forty-five minutes. Dinner was served at the Yacht Club and about 125 people sat down at the tables. Several hours were spent in sailing on the lake, and the return was a "go-as-you-please." Mr. Bettys acted as marshal of the parade, which was in charge of A. G. Pennington, Dr. J. P. Frismuth and H. Bartol Brazier. The club intends to have other runs during the summer.

CHICAGO A. C.

Following is the itinerary of the Chicago-Mammoth Cave Club run, which this club has organized for June 25 to July 8:

Thursday, June 25, Chicago to Cedar Lake (40 miles); Friday, June 26, Cedar Lake to La Fayette, Ind. (75 miles); Saturday, June 27, La Fayette to Indianapolis (72 miles); Sunday, June 28, Indianapolis to Richmond (68 miles); Monday, June 29, Richmond to Cincinnati (64 miles); Tuesday, June 30, Cincinnati to Lexington, Ky. (89 miles); Wednesday, July 1, Lexington to Bardstown (79 miles); Thursday, July 2, Bardstown to Mammoth Cave (66 miles); Friday, July 3, sight seeing at the Cave; Saturday, July 4,] moth Cave to Bardstown (66 miles) day, July 5, Bardstown to Louisville (39 miles); Monday, July 6, Louisville to Indianapolis (119 miles); Tuesday, July 7, Indianapolis to Logansport (72 miles); Wednesday, July 8, Logansport to South Bend (68 miles); Thursday, July 9, South Bend to Chicago (111 miles).

BERKSHIRE A. C.

On June 13 about twenty-five members of the Berkshire A. C., of Pittsfield, Mass., and their friends participated in a run to Lenox. President F. W. Brandow, Franklin Wiston, Samuel G. Colt, E. G. Breed and Dr. E. S. Robinson have been appointed a committee to arrange for the second hill climbing contest, which has already been chronicled in these columns. Silver cups have been presented to Erwin H. Kennedy, of Pittsfield, and Charles Crane, of Dalton, as trophies won in the first hill climbing contest. The club elected four new members at its last meeting, and a resolution was adopted that the club, in order to promote good feeling toward automobilists, shall take every precaution to prevent its members abusing the sport or in any way causing ill will by means of fast or reckless operation of their automobiles, and that if any just complaint against a member shall reach the club the secretary shall send notice to the offender. In case of a second complaint the matter will be referred to the executive committee for action, and if a third complaint the offending member may be expelled.

Selden Patent Matters.

It becomes daily more apparent that the Association of Licensed Automobile Manufacturers relies not merely on the Selden patent for its control of the industry, but also on the other patents—already over 400 in number—that belong to its members. It is even intimated that the next infringement proceedings by the association may be based upon violations of these other patents rather than the Selden.

In regard to the persistent rumors to the effect that prominent concerns have been denied licenses, or have withdrawn their applications, it is now flatly denied by the officials of the association that any concern so far making application has been denied a license or has withdrawn the application. It is further claimed that all applications are given the promptest attention possible.

Many daily newspapers of the country have lately announced the Association of Licensed Automobile Manufacturers as "the $70,000,000 automobile trust." The association officials denounce this characterization as both untrue and unfair, inasmuch as the avowed purpose of their or tion is one of mechanical dev rather than of trade restriction.

Rumors are current ir newly organized Corbi ration, of New Britain outside the associ pate

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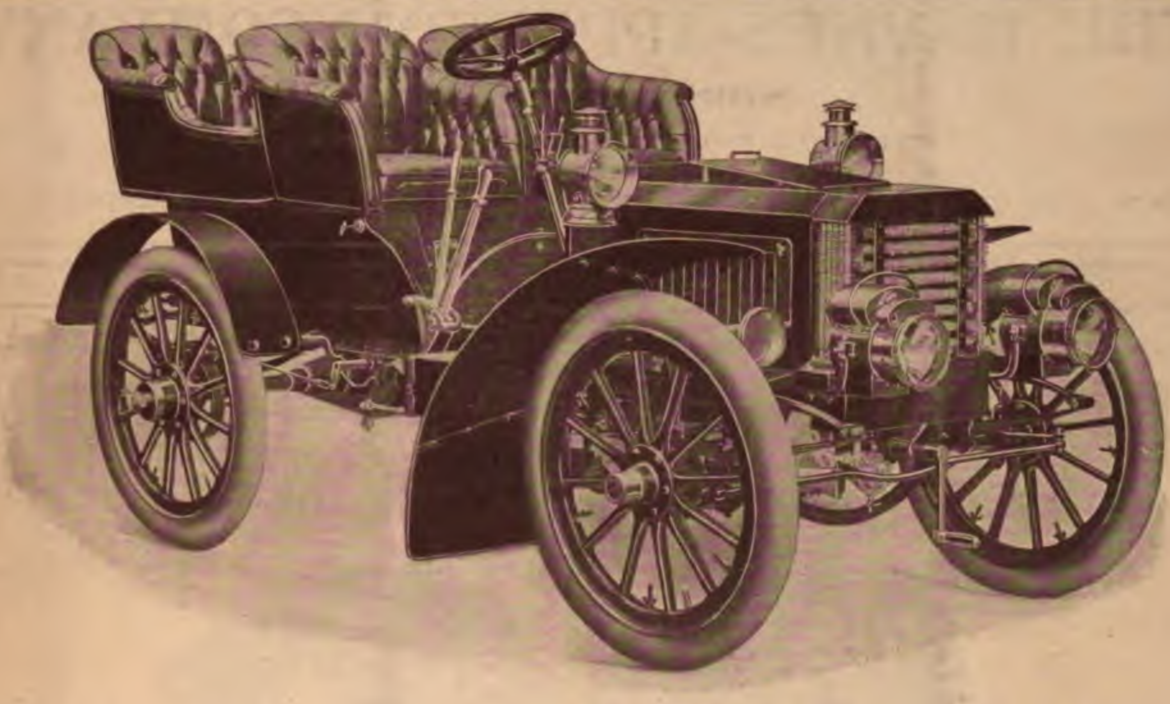

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SECOND NEW YORK SHOW NUMBER.

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VOLUME 11. FEBRUARY 25, 1903. NUMBER 8.

SECOND CHICAGO SHOW NUMBER.

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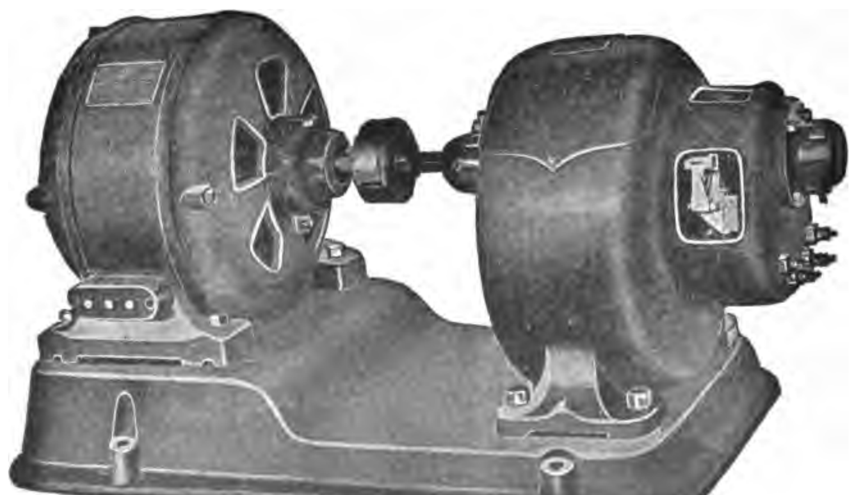

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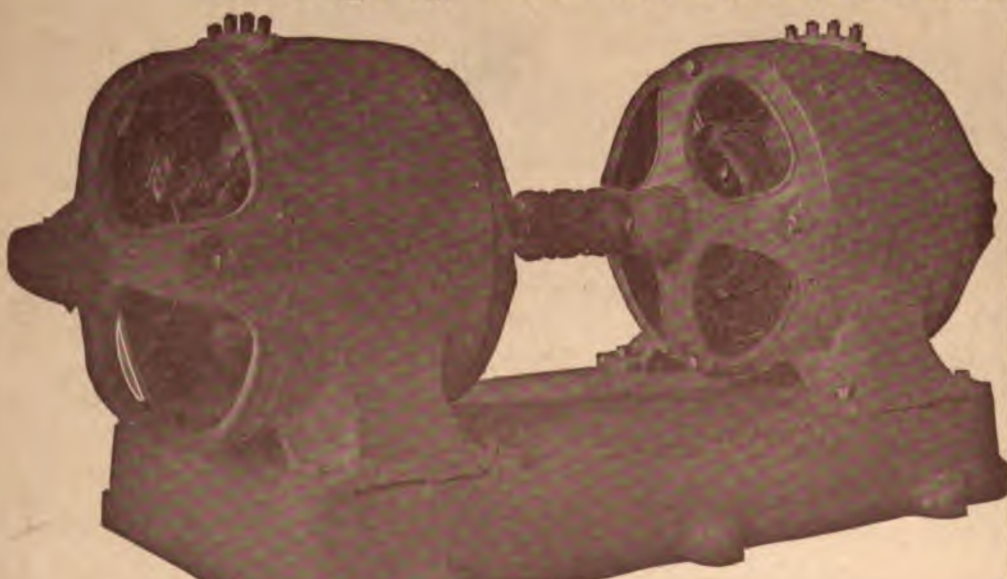

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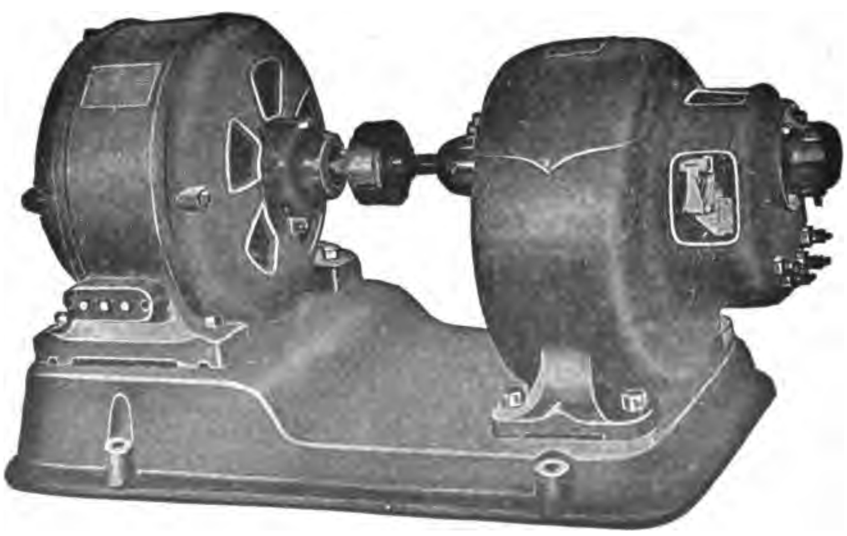

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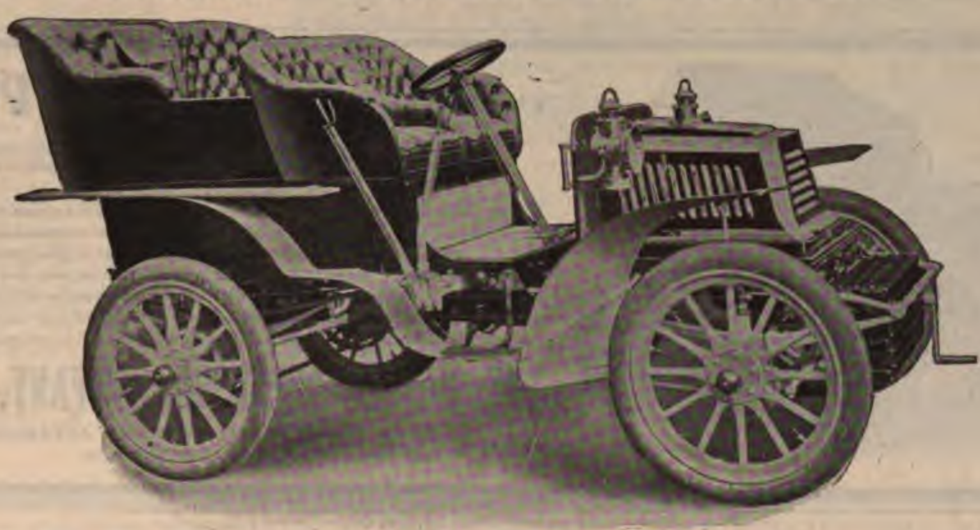

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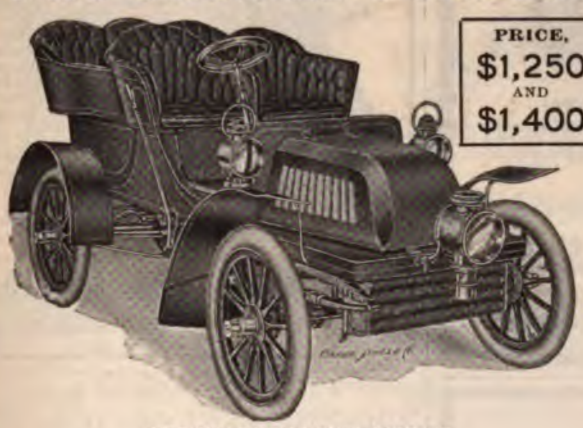

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SPECIAL NOTICES.

Want, For Sale and similar advertisements only inserted under this heading at the rate of 20 cents a line of about seven words. Copy for this department should be in our hands not later than the Monday morning preceding the issue for which it is intended. Nothing less than two lines accepted. Answers addressed to Horseless Age will be forwarded if postage is enclosed.

For Sale.

NEW 1903 Northern Runabout; price, $650. W. H. Greene, 97 Appleton street, Lowell, Mass.

FOR SALE CHEAP—Gasoline car holding eleven; fine for rentals. E. B. Finch, Detroit.

PRESCOTT Steam Automobile; good as new. Oneida Automobile Company, Oneida, N. Y.

WILL sacrifice 10 h. p. French Gasoline Touring Car; owner in Europe.
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FOR SALE—Model C Packard, almost new, dos-a-dos seat, extra headlight; $900.
A. C. Banker, 458 Wabash avenue, Chicago.

FOR SALE—Haynes-Apperson Runabout, new in November; a bargain at $800.
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TOP LOCO, one-half cost; bargain, because engine not worn and all in unusually fine condition, like new. Hill, 100 Boylston street, Boston.

ONE LOCKE, 14 inch burner, nearly new, with casing; one generator, used some; one Mobile Dos-a-dos, A1 shape. Room 414 Lambie Building, Northampton, Mass.

FOR SALE—Twelve passenger Automobile Brake, used short time; excellent running order; good reasons for selling. A. C. Smith, 76 Laurel Hill avenue, Norwich, Conn.

FOR SALE—Two Mark VIII Columbia Gasoline Tonneaus; also Locomobile, with leather top; all first class condition; bargain.
H. F. Raser, Ashtabula, Ohio.

FOR SALE—Two Steam Surreys, one Locomobile (carries six) and one Conrad; every latest improvement; send for photos.
Arthur Boyce, Atlantic City, N. J.

WHITE TOURING CAR for sale; run less than 100 miles; owner must sell; bargain, $1,850. Address S. B., 1409 Missouri Trust Building, St. Louis, Mo.

STEVENS DURYEA, $1,100; delivered April 1, 1903; was in New York and Chicago auto. shows; used 500 miles; complete; perfect order; will show. C. B., 1239 Fulton street, Brooklyn, New York.

A BARGAIN, on account of owner going abroad, 1902 Knox, with leather top and boot, two brand new Dunlop tires and machine in magnificent condition throughout. Address G. L. M., care Horseless Age.

FOR SALE—1903 Winton Touring Car, equipped with $50 headlight, new, and will sell for $2,650, delivered in New York, Providence or Boston.
H. B. Deming,
66 Burnett street, Providence, R. I.

1902 STANLEY Steam Carriage, in first class condition; has solid back seat, mud guards, three lamps, tank filler, extra valve between gasoline tanks, heavy springs, newly varnished; $425 f. o. b. Dr. A. H. Martin, Lynn, Mass.

FOR SALE—At a bargain, Model C Packard, lately overhauled and remodeled, in perfect running order; Goddard top, wheel base, 8 feet; thoroughly up to date in appearance and operation; send for photo; owner getting four cylinder machine. Address A. B., care Horseless Age.

FOR SALE—One 10 h. p. Gasoline Motor; one 12 h. p. Upton Transmission Gear, Motor made by St. Louis Motor Carriage Company and complete with carburetor; two Splitdorf Batteries and Muffler; practically new; price, $350.
Frank W. Bacon,
1216 Jones street, Omaha, Neb.

FOR SALE—Light Loco Surrey, new wheels, tires, chain, sprockets, burners, tank filler, Kelley generator; in constant service and repair; price, $450; also one new heavy Steam Surrey, large boiler and tanks, steam air pump, hub brakes, chainless drive, enclosed engine, pump oiler, automatic water regulator, wood wheels, solid tires; a beautiful vehicle; rides like a Pullman. W. P. Norton, 130 Prospect street, Torrington, Conn.

FOR SALE—1902 Olds, repainted, A1 condition, with new 1903 carburetor, muffler and cutout, $350. H. J. Parker, Attleboro, Mass.

FOR SALE—1902 Model F Packard, almost new, A1 condition, with lot of extras, $1,600.
H. J. Parker, Attleboro, Mass.

FOR SALE—Mark XIX Columbia Electric Tonneau, 1902 model; used slightly; in first class condition; for sale at a bargain. Address Hoffman & Shimer, Bethlehem, Pa.

STANLEY Steam Carriage, chainless type, in fine condition; Howard atomizer, tank filler, mud guards and lamps; price, $500, Boston. Address Box 1,432, Boston, Mass.

FOR SALE—One 9 h. p. Darracq, tonneau style; new last September and in first class condition; would take as part payment light runabout. P. J. Englesbe, Bound Brook, N. J.

FOUR Goodrich 30 inch by 3 inch clincher double tube tires, with rims; in use two months; make an offer.
M. R. MUCKLE, Jr.,
Stephen Girard Building, Philadelphia.

1903 WINTON TOURING CAR for sale; perfect order and but little used; no bargain hunters or those expecting cheap price need apply. Address M. W. Houck & Brother, 111 Hudson street, New York.

FOR SALE—Peerless Touring Car, 16 h. p.; has new 1903 transmission; cost $2,900; new last September; will sell for $2,000. Address
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Engine for steam surrey, Keim, 3x3½ inches	100
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Boiler and burner, 18x18 inches, 850 tubes	100
Boiler and burner, 18x32 inches, 1,368 tubes	150
Boiler, Salamandrine, 6 h. p.	90
Engine, twin cylinder, 4½x4½, Aultman	150
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Complete steam Surrey	550
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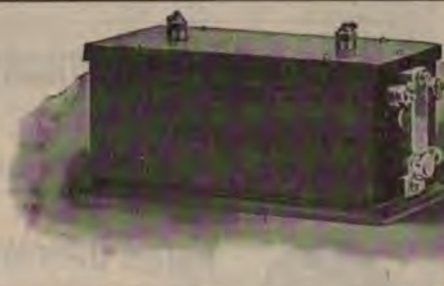

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